

Writing and Science Connections:
Integrated Instruction and Assessment

Alison Morawek, B.A., B.Ed.

Department of Graduate and Undergraduate
Studies in Education

Submitted in partial fulfillment
of the requirements for the degree of
Masters of Education

Faculty of Education, Brock University
St. Catharines, Ontario

© Alison Morawek 2011

Abstract

Learning to write is a daunting task for many young children. The purpose of this study was to examine the impact of a combined approach to writing instruction and assessment on the writing performance of students in two grade 3 classes. Five forms and traits of writing were purposefully connected during writing lessons while exhibiting links to the four strands of the grade 3 Ontario science curriculum. Students then had opportunities to engage in the writing process and to self-assess their compositions using either student-developed (experimental group/teacher-researcher's class) or teacher-created (control group/teacher-participant's class) rubrics. Paired samples *t*-tests revealed that both the experimental and control groups exhibited statistically significant growth from pretest to posttest on all five integrated writing units. Independent samples *t*-tests showed that the experimental group outperformed the control group on the persuasive + sentence fluency and procedure + word choice writing tasks. Pearson product-moment correlation *r* tests revealed significant correlations between the experimental group and the teacher-researcher on the recount + ideas and report + organization tasks, while students in the control group showed significant correlations with the teacher-researcher on the narrative + voice and procedure + word choice tasks. Significant correlations between the control group and the teacher-participant were evident on the persuasive + sentence fluency and procedure + word choice tasks. Qualitative analyses revealed five themes that highlighted how students' self-assessments and reflections can be used to guide teachers in their instructional decision making. These findings suggest that educators should adopt an integrated writing program in their classrooms, while working with students to create and utilize purposeful writing assessment tools.

Table of Contents

Abstract	ii
List of Tables	vi
List of Figures.	viii
 CHAPTER ONE: INTRODUCTION TO THE STUDY.	 1
Background of the Problem	5
Statement of the Problem	8
Research Questions	10
Rationale	11
Theoretical Framework.	12
Scope and Limitations of the Study	13
Clarification of Terms	15
Outline of the Remainder of the Study	17
 CHAPTER TWO: REVIEW OF RELATED LITERATURE	 20
Theoretical Framework	20
The Stages of Writing Development	23
Models of Writing Instruction	28
Integrated Curriculum	36
Rubrics as Writing Assessment Tools	43
Reflective Practices of Students and Teachers	47
Chapter Summary	51
 CHAPTER THREE: METHODOLOGY AND PROCEDURES	 53
Research Design	53
Selection of Site and Participants	57
Intervention Study	65
Instrumentation	67
Quantitative Measures	67
Qualitative Measures	70
Instrument Validation	71
Field Procedures	74
Summary of Field Procedures	81
Data Analyses	81
Limitations	88
Establishing Credibility	92
Ethical Considerations	93
Restatement of the Area of Study	93

CHAPTER FOUR: PRESENTATION OF RESULTS.	96
Quantitative Findings.	99
Qualitative Findings.	119
Theme 1: Students' Understandings of the Forms and Traits of Writing.	121
Theme 2: Students' Self-Perceptions as Writers.	129
Theme 3: Empowering Students with Assessment Tools.	134
Theme 4: Instructional Considerations when Integrating Curriculum.	140
Theme 5: Transforming Teacher Perceptions of Effective Instructional and Assessment Practices	144
Chapter Summary	150
 CHAPTER FIVE: SUMMARY, DISCUSSION, AND IMPLICATIONS.	155
Summary of the Study.	155
Discussion.	162
Implications for Practice.	182
Implications for Theory.	188
Implications for Future Research.	193
Conclusion.	197
 References.	199
 Appendix A: Reading Assessment Sample Pages	214
Appendix B: Reading Assessment Comprehension Rubric	216
Appendix C: Teacher-Created Integrated Rubrics	217
Appendix D: Student-Developed Integrated Rubrics.	222
Appendix E: Student Interview Protocol.	227
Appendix F: Teacher-Participant Interview Protocol	229
Appendix G: Student Reflection Prompts.	231
Appendix H: Teacher Reflection Prompts.	241
Appendix I: Research Ethics Board Clearance Letter.	242

List of Tables

Table		Page
1	Grade 3 EQAO Scores for 2009/2010	62
2	Integrated Writing and Science Instruction	66
3	Pretest Writing Topics	77
4	Posttest Writing Topics	79
5	Sample 5-Week Unit: Instruction, Assessment, and Data Collection At-A-Glance	82
6	Total Values for Student-Generated and Teacher-Created Rubrics	98
7	Independent Samples <i>T</i> -tests of Science Pre- and Posttests for Control and Experimental Groups	103
8	Paired Samples <i>T</i> -tests of Experimental Group's Rough Draft and Good Copy Self-Assessments	104
9	Paired Samples <i>T</i> -tests of Teacher-Researcher's Scores for Experimental Group's Rough Drafts and Good Copies	106
10	Paired Samples <i>T</i> -tests of Control Group's Rough Draft and Good Copy Self-Assessments	107
11	Paired Samples <i>T</i> -tests of Teacher-Researcher's Scores for Experimental Group's Pre- and Posttest Writing Pieces	109
12	Paired Samples <i>T</i> -tests of Teacher-Researcher's Scores for Control Group's Pre- and Posttest Writing Pieces	110
13	Interrater Reliability for Teacher-Researcher and Teacher-Participant Scores of Students' Pre- and Posttest Writing	112
14	Independent Samples <i>T</i> -tests for Teacher-Researcher's Scores of Writing Posttests	114
15	Independent Samples <i>T</i> -tests for Teacher-Participant's Scores of Writing Posttests	115

16	Interrater Reliability for Experimental Students' Writing Self-Assessments with Teacher-Researcher's Assessments of Their Writing	118
17	Interrater Reliability for Control Students' Good Copy Writing Self-Assessments with Teachers' Posttest (Good Copy) Assessments of Their Writing	120

List of Figures

Figure		Page
1	The Relationship between Study Research Questions and Data Sources	89
2	The Relationship between Study Research Questions and Data Analysis Measures	90

CHAPTER ONE: INTRODUCTION TO THE STUDY

Learning to write is a daunting task for many young children. Moreover, writing is often one of the most complex challenges that individuals will attempt to master in their lifetimes. The attainment of writing proficiency is as necessary as acquiring competence in oral communication and reading, as the written word allows us to communicate ideas to an intended audience, for a specific purpose (Ministry of Education of Ontario, 2006). To write is to produce symbols or letters that represent the sounds of a language, in order to create a meaningful message and provide information to an audience (Schultz & Fecho, 2000). The development of written language, therefore, involves a complicated relationship between the representation of symbols and the negotiation of social worlds (Schultz & Fecho, 2000). Writing, however, is not a unitary construct.

The act of writing is intertwined with other language-based skills, such as speaking, listening, and reading, and there exist many overlaps among these complex, interdependent processes. A distinction is most often made between the practices of reading and writing, yet these processes are closely linked and should not be considered as individual concepts (Neuman, 2005).

Today, instructional views concerning the relationship between reading and writing differ both in terms of the centrality assigned to each process in the early years of schooling, and in terms of the order in which they are taught in various languages and school curricula. (Rieben, Ntamakiliro, Gonthier, & Fayol, 2005, p.

Researchers will, however, agree that both reading and writing skills must be introduced at an early age, once children have developed competence in speech. The acquisition of both reading and written language skills must be explicitly taught in order for an individual to gain competency in these forms of communication.

Once children can read their written work, they must then begin to develop the ability to use writing for the acquisition of knowledge and learning. In writing to learn, students can explore new ideas and make sense of their experiences (MacArthur, Graham, & Fitzgerald, 2006). Writing to learn offers students the opportunity to use various conventions and forms of writing within an array of contexts (MacArthur et al., 2006). Writing to learn helps students to transform content area information (i.e., science, social studies, and mathematics concepts) into “ways of understanding ourselves and our cultural communities through the study of various academic traditions” (MacArthur et al., 2006, p. 235). With so much to contend with in first developing basic writing skills, and then using these skills to write for the acquisition of knowledge, how then does one become a competent writer?

A plethora of rules, procedures, and processes exist that children must acquire and apply in order to become successful writers. Furthermore, it is effective writing instruction that will assist students in developing the necessary skills to write well. Currently, there is an array of viable approaches to writing instruction available for educators to utilize in their classrooms (e.g., Calkins, 1994; Graves, 1994; Tompkins, 2000). The Ministry of Education of Ontario has outlined the key components of an effective writing program in the updated, *The Ontario Curriculum, Grades 1-8: Language* document (Ministry of Education of Ontario, 2006). These components include

(a) generating, gathering, and organizing ideas and information for specific purposes and audiences in one's writing; (b) drafting and revising written work using a variety of writing forms; (c) applying editing, proofreading and publishing strategies to refine and present written work; and (d) reflecting upon one's writing in order to identify strengths and areas for improvement (Ministry of Education of Ontario, 2006). It is through copious opportunities to apply these components of writing that students will gain the ability to become successful, lifelong writers (Ministry of Education of Ontario, 2006).

According to the Ministry of Education of Ontario (2006), students need to become disciplined thinkers in order to communicate their ideas clearly and effectively in their writing. Conversely, students require numerous opportunities to write, as the process of writing enables them to clarify their thinking, and to sort out and express their thoughts and feelings (Ministry of Education of Ontario, 2006). As children learn to select and organize their ideas, they must also keep in mind the purpose for which they are writing and the audience they are addressing. Students should be given tasks that provide opportunities to produce writing that is interesting and original, and that reflects their capacity for independent, critical thought (Ministry of Education of Ontario, 2006). Writing activities that students see as meaningful, and that challenge them to think creatively about topics and concerns of interest to them, will lead to a more thorough command of the essential skills of writing (Ministry of Education of Ontario, 2006). Accordingly, there are four goals of writing instruction (Ministry of Education of Ontario, 2005a) that Ontario teachers are expected to address in order to assist students in achieving success as writers:

1. To write clearly and creatively, to convey a message;

2. To communicate ideas, thoughts, feelings, and experiences;
3. To understand that writing is a reflective and interactive process;
4. To understand the different purposes, audiences, and forms for writing;

The Ministry of Education of Ontario (2005) espouses that it is through the achievement of these goals that students begin to attain the skills to become successful, lifelong writers.

Unfortunately, the task of preparing students to become lifelong writers is not an easy one. As evidence, the most recent Ontario standardized test scores are often cited. Ontario students in grades 3 and 6 continued to demonstrate challenges in the area of writing on recent EQAO (Education Quality and Accountability Office) tests (Education Quality and Accountability Office, 2010). For example, in 2009/2010, only 66% of grade 3 students achieved a Level 3 score in writing and only 4% of these students achieved Level 4 scores (Education Quality and Accountability Office, 2010). These scores fall below the expectations of the Ontario Ministry of Education, which targets that 75% of grades 3 and 6 students meet the provincial standard (Level 3) in reading, writing, and mathematics (Ministry of Education of Ontario, 2008). During writing tasks, students seem to struggle most to develop a main idea with sufficient or supporting details, and to organize information and ideas in a coherent manner (Education Quality and Accountability Office, 2010). Students also have difficulty completing longer writing compositions (a full page), than shorter, half-page written compositions (Education Quality and Accountability Office, 2010). This information clearly indicates there is a need for more focused, purposeful writing instruction in order to not only improve the

standardized test scores of young writers, but to enable these children to develop the necessary skills to become effective writers in the classroom and beyond.

Background of the Problem

Typically, primary writing instruction has focused to a great extent on narrative (fiction) writing, as teachers appear to value this form of writing over expository (nonfiction) forms (Chapman, 2002). Many primary teachers also assume that narrative writing is the easiest of the written forms for young children to learn (Chapman, 2002). However, researchers of young children's writing have revealed that learning a variety of genres is an important aspect of children's literacy development (Calkins, 1994; Chapman, 2002; Donovan, 2001; Kamberelis, 1999; Wollman-Bonilla, 2000). In fact, the written component of the grades 3 and 6 EQAO tests consistently includes two specific writing prompts: one narrative (typically a story or recount) and one expository (typically a procedural or persuasive prompt).

Despite the critical importance of expository writing, schools have not been very effective in developing children's writing abilities in a variety of genres, creating an "expository gap" by the time a child reaches grade 4 (Chapman, 2002). It is, therefore, important to expose students to a wide range of written genres and formats, so that young writers can learn how to reach their audience effectively, and can discover the critical links between their reading and writing (Ministry of Education of Ontario, 2005a). However, writing skills in the various genres will not develop naturally, and, thus, need to be taught systematically and explicitly (Chapman, 2002). In addition to this, teaching children how to construct various composition forms may not be sufficient to provide students with a clear understanding of the craft of writing. The inclusion of trait-based

writing instruction may assist students to overcome some of the challenges of learning to write with clarity and precision within the various genres.

The traits of writing are the six key qualities or characteristics of writing that “make the writing work” (Culham, 2005, p. 7). The genesis of the 6 + 1 traits of writing approach (Culham, 2003) has transformed writing instruction. The traits of writing are used widely by North American teachers to enhance their writing instructional programs. Unfortunately, some teachers rely solely on the traits of writing to deliver the writing curriculum (Culham, 2006). The traits should not be taught in isolation, but should be introduced in the context of daily literacy activities (Culham, 2006). On some occasions, the teacher may focus on a specific trait of writing during a lesson, and this trait-based instruction should then be integrated into students’ daily writing (Ministry of Education of Ontario, 2005a, p. 23). As students’ skills develop, they should be given opportunities to write more complex, lengthy pieces that integrate the traits of writing within various narrative and expository forms. In this fashion the forms and traits of writing should unfold as lessons and activities blended through the writing curriculum. Furthermore, these writing skills can be extended to and integrated within the entire curriculum thereby connecting concepts found in other subject areas (Ministry of Education of Ontario, 2005a).

Ontario educators are currently faced with a substantive number of expectations in the various subject areas of the Ontario elementary curriculum (Ministry of Education of Ontario, 1998a; 1998b; 2004; 2005b; 2006; 2007). These subject areas include: *Health and Physical Education* (Healthy Living, Fundamental Movement Skills, Active Participation); *The Arts* (Visual Arts, Dramatic Arts, Music); *Social Studies, Grades 1-6*

(Heritage and Citizenship, Canada and World Connections); *Mathematics* (Number Sense and Numeration, Measurement, Patterning and Algebra, Geometry and Spatial Sense, Data Management and Probability); *Language Arts* (Reading, Writing, Oral and Visual Communication, Media Literacy); and *Science and Technology* (Understanding Life Systems, Understanding Earth and Space Systems, Understanding Matter and Energy, Understanding Structures and Mechanisms). It is not surprising that many teachers state that time constraints are a major issue as it is no easy task to address all expectations over the course of a school year. A common solution is for educators to consider the integration of subject areas and disciplines (Drake & Burns, 2004).

Since literacy is at the crux of all learning, it would make sense to create cross-curricular connections using reading and writing as a basis for this integration (Carr, 2007; Compton, 2002; Drake & Burns, 2004; Harvey & Reid, 2001; Jacobs, 1989). Using literacy pedagogy is a natural connection for exploring other subjects and concepts, such as scientific ideas (Liu & Akerson, 2002). “Writing, reading, prediction, [and] creative and critical thinking are integral processes in scientific research and inquiry” (Liu & Akerson, 2002, para. 8), making the link between science and literacy a natural one. An integrated curriculum, particularly one where such key areas as science and literacy are intertwined, would involve marrying the objectives found within the science curriculum (or other subject area) with those expectations that are part of one’s literacy program. Unfortunately, teachers who are not versed in the nuances of cross-curricular integration are hesitant to adopt this approach to instruction, in part due to the challenges in planning for instruction and assessing students’ work (Drake & Burns, 2004). However, one of the

goals of this research is to reveal the benefits of integrated instruction and assessment practices.

To deliver effective, integrated writing instruction, it is necessary for teachers to possess authentic assessment tools to evaluate students' written work. It is common practice for educators to devise their own rubrics, checklists, scales, and other assessment tools to assess and evaluate their students' work. At times, students are given the opportunity to assist in the development of these tools, but more often than not, students are not privy to assessment information until the final, marked product has been returned to them. There is ample evidence that student achievement is enhanced through formative assessment feedback and participation in the summative assessment process (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Black & Wiliam, 1998; Sadler, 1998).

As well, students are the biggest stakeholders in the assessment of their work, and should, therefore, be given ample opportunity to participate in the assessment process. Self-assessment allows students to track and modify their work in order to enhance their metacognitive awareness, develop greater self-direction in their learning, and, in turn, make improvements to their work (Lake, 2000). Providing students with time to reflect upon their learning is also an essential component of self-assessment. Self-assessment and reflection provide students with the opportunity to become increasingly aware of their attitudes, skills, and knowledge, and to take greater responsibility for their learning (Lake, 2000).

Statement of the Problem

A substantive number of students are currently achieving below the provincial standard in the area of writing (Education Quality and Accountability Office, 2010).

Existing research has shown that elementary school students, particularly in the primary grades, have difficulty developing and mastering effective writing skills (Education Quality and Accountability Office, 2009). The most recent EQAO scores for the 2009/2010 academic year show that only 70% of grade 3 students in Ontario achieved at or above the provincial standard for writing, with 66% of students achieving a Level 3, and 4% of students achieving a Level 4 (Education Quality and Accountability Office, 2010). Yet, it is only throughout the past 3 decades that educational researchers have focused their study of what students do when engaged in writing and what teachers can do to support and enhance the writing development of their students (MacArthur et al., 2006). In general, there is a void in the area of writing instruction, self-assessment, and integrated curriculum.

In order to address the lack of research in these areas, one goal of this study was to implement a writing instruction program that integrated five forms of writing (recount, report, persuasive, narrative, procedure) and five traits of writing (ideas, organization, sentence fluency, voice, word choice) within the grade 3 science curriculum, through genre-specific writing lessons. In this study, it was also necessary to gain a better understanding of students' self-efficacy as writers as they develop their skills. According to Pajares (2003), students' views of self-efficacy in terms of their writing capabilities directly impact upon their writing motivation and their overall writing achievement in school. Students' self-assessments of their writing, as well as their reflections on their writing, were, therefore, used as part of this research, to help guide the instructional decision making process.

These goals addressed the need for further research in the area of writing instruction, assessment, and curriculum integration. It is necessary to provide continuity and consistency in the type of literacy instruction that is delivered from JK to grade 8. MacArthur et al. (2006) feel there is a definite need for research in writing instruction “that supports children’s successful growth in written communications” (p. 140). Through dissemination within school communities, school boards, and on a provincial level, it is hoped that this study will help to create and maintain instructional continuity in the area of writing.

Research Questions

These goals gave rise to a series of research questions that were addressed in this study:

1. Does an integrated approach to writing instruction assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, word choice) of writing within science-based written compositions?
2. Is there a difference between the writing compositions of grade 3 students who have received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy) and the writing compositions of grade 3 students who have not received the science integration component throughout language arts instruction?
3. Can grade 3 students reliably self-assess their written compositions with student-generated rubrics?

4. Can grade 3 students reliably self-assess their written compositions with predeveloped rubrics provided by the classroom teacher?
5. How aware are grade 3 students of the forms and traits of writing after receiving an integrated approach to writing instruction?
6. How can grade 3 writers' self-assessments and reflections be used to guide teachers in their instructional decision making?

Rationale

I began my teaching career 9 years ago, in a grade 5/6 classroom. I remained in the junior division teaching grades 4 and 5 for 4 years, before choosing to work with younger students in grade 2. Since that time, I have also taught grade 3, and have worked as a literacy coach with JK-8 teachers and students. I am now returning to a grade 3 classroom to conduct this study.

Although I thoroughly enjoyed working with students in the junior division, I noticed that many of these children left the primary grades with a lack of confidence as writers. Writing was an arduous and unwelcome task for many of these students, as they did not possess certain key skills necessary to write effectively. It became my mission and my passion to study the writing development of primary-aged students, to determine the causes of students' frustrations and difficulties in learning to write.

I have had the opportunity, over the past few years, to informally study grades 2 and 3 students' writing, and have developed a holistic writing program for primary students that encompasses the six traits of writing, as well as six specific forms of writing. Accordingly, I have developed integrated assessment tools to evaluate students' writing after a combination of trait-based and genre-specific writing lessons. Through

several action research projects, I have gained some research experience in the area of primary students' writing development and I firmly believe this is an area that requires continued study and focus.

I feel it is crucial that all students' writing be purposeful and have authentic, real world connections. Therefore, I wanted to examine the impact that the integration of the grade 3 science curriculum would have on students' attitudes towards writing, as well as the impact this would have on the quality of their written work. I also feel it is critical that students take part in the assessment process. Thus, I examined the influence that student self-assessment and reflection had on the quality and depth of their written work. I contend that this area needed to be explored as a means of assisting educators in refining their literacy instruction.

Theoretical Framework

This research study was supported by a constructivist theoretical approach to learning, which emphasizes authentic, challenging activities for students and teachers. John Dewey believed that the constructivist process begins with the knowledge that children possess as a result of their previous experiences (as cited in Beal, Grable, & Robertson, 2001). A connection must be established between students' existing knowledge base and the material to be learned. Any new learning must then become a part of students' experiences and schemata (Beal et al., 2001).

The goal of constructivism is to create a learning community that is closely related to the collaborative practices of the real world (Huitt, 2003). In a constructivist environment, students assume responsibility for their own learning, and they strive to develop metacognitive abilities to monitor and direct their learning and performance

(Huitt, 2003). In his writings, Vygotsky stressed the importance of social interaction and mentorship on the development of metacognition and self-direction in one's learning (as cited in McCown et al., 1999).

In adhering to a constructivist model of learning, this study helped to present research in understanding the importance of students' identity construction for overcoming struggles in literacy motivation (Oldfather, 2002). One of the keys to understanding students' struggles in motivation lies in knowing how students construct a sense of self, how students adapt to the culture of the classroom, and how they construct identities as readers, writers, and thinkers (Oldfather, 2002). Thomas and Oldfather (1997) posit that not only are instructional practices and the acquisition of knowledge socially constructed, but assessment and evaluation "are [also] socially constructed, specific to particular situations, and subject to multiple interpretations (p. 108).

A second theoretical framework to this study was the theory of experiential learning (Kolb, 1984). According to Rogers and Freiberg (1994), learning is facilitated when students participate in the learning process and have control over the nature and direction of their learning. Throughout this current study, students had opportunities to reflect upon the writing instruction that was facilitated by the teacher-researcher. Self-assessment and reflection are the principal methods of progress and change, and the development of metacognitive skills and an openness to change are crucial to the learning process (Rogers & Freiberg, 1994).

Scope and Limitations of the Study

This study took place in two grade 3 classrooms, and the sample size consisted of 18 students in the teacher-researcher's class, and 20 students in the teacher-participant's

class, for a total of 38 students. One of the students in the teacher-researcher's class is on an IEP (Individualized Education Plan) for learning disabilities in the areas of literacy and numeracy. One of the students in the teacher-participant's class is also on an IEP for literacy accommodations. Data collection from such a specific, selective population may limit the scope of this study.

The findings of this research were dependent on the grade 3 students' abilities to utilize the integrated rubrics for self-assessment purposes, and to articulate their perceptions of the forms and traits of writing through independent, written reflections. To ascertain the students' perceptions of the writing instruction taking place in their respective classrooms, two students from each classroom were asked to participate in open-ended interviews. Students with poor literacy communication skills may have had difficulty responding to the written reflections and interviews. These samples may then have proven ineffective for gathering information about students' writing abilities. The limitations that relate to students' abilities to articulate their perceptions were considered in the discussion of this research.

Qualitative data were collected from one teacher-participant, based on her observations of the writing instruction conducted by the teacher-researcher. The teacher-participant is a Caucasian, highly-motivated individual who has been teaching for 30 years. Through interviewing techniques, the teacher participant was asked to reflect upon and articulate the writing instruction and assessment strategies presented in this study. The teacher's reflections provided a foundation for classroom observations and subsequent document analyses to occur. However, it must be noted that observations were only made by one individual, limiting these qualitative findings.

Instructional time was a final limitation to this study as there are only 100 minutes allotted to literacy instruction per day, and there are many strategies, in addition to writing instruction, that must be presented to students during this literacy block (i.e., reading instruction, oral/visual communication strategies, media literacy). It should also be noted that there are often interruptions to the instructional day that cannot be controlled (i.e., school-wide announcements, assemblies, field trips, fundraising events). The timeline of this study was followed as closely as possible, but some flexibility was required by both the teacher-researcher and the teacher-participant.

Clarification of Terms

The act of *writing* occurs when one takes ideas, thoughts, and emotions and transfers these onto paper (or a computer screen) using knowledge of language conventions and the writing process to create meaningful text (Ministry of Education of Ontario, 2005a). Writing is a powerful instrument used to express thoughts, feelings, and judgements surrounding what has been read, seen, or experienced by an individual text (Ministry of Education of Ontario, 2005a). The Ministry of Education of Ontario documents (2005a; 2006) were used in the study to provide information and definitions on the skills and processes of writing as they pertain to Ontario students, as well as students worldwide.

The term *text form* refers to a category or type of text that has certain defining characteristics. Text forms are also referred to as *genres*. Texts can be categorized in many different ways, according to their subject, style, or presentation of ideas. The two main text forms are *narrative* and *expository*. Both of these text forms possess various subgenres. The narrative (or literary) text form encompasses writing that has a fictional

foundation, such as fairy tales, fables, or short stories. The expository text forms include recounts, reports, procedures, and persuasive writing. There is no single defining list of text forms for teachers to use with their students during writing instruction. The concept of text forms is simply useful as a way for readers and writers to think about the purpose of a text and its intended audience (Ministry of Education of Ontario, 2005a).

It should be noted that the term *form(s)* was used throughout this study when referring to a specific type of writing (i.e., recount, report, narrative, persuasive, procedure), but the term *genre-specific* was used when referring to the forms of writing in an adjectival manner, as they pertain to instruction and assessment (i.e., *genre-specific instruction*). In this study, five specific forms of writing (recount, report, narrative, persuasive, procedure) were examined in concert with five writing traits (ideas, organization, sentence fluency, voice, word choice) to determine how an integration of genre-specific and trait-based instruction impacts on students' writing achievement.

The *traits of writing* are the key characteristics of good writing, according to Ruth Culham (2005), pioneer and developer of several trait-based writing programs. There are six specific traits of writing that should be introduced to young students to help them develop and enhance their writing skills. These include *ideas* (clear, focused content containing a message and supporting details), *organization* (writing is in order, makes sense, and includes strong transitions words), *voice* (active and engaging text with a specific purpose and audience in mind), *word choice* (appropriate words selected to convey a message, idea, or feeling), *sentence fluency* (clear, concise sentences of various lengths), and *conventions* (proper use of grammar, punctuation, and spelling). As previously stated, five of these traits of writing (with the exclusion of the conventions

trait) were combined with five forms of writing during literacy instruction. These five traits of writing were also joined with five forms of writing for assessment purposes within a series of five integrated rubrics.

In a classroom that espouses an *integrated curriculum* approach, students are provided with opportunities to work towards meeting expectations from two or more subjects within a single unit, lesson, or activity (Ministry of Education, 2006). “By linking expectations from different subject areas, teachers can provide students with multiple opportunities to reinforce and demonstrate their knowledge and skills in a range of settings” (Ministry of Education of Ontario, 2006, p. 23). As part of this study, the four strands of the grade 3 Ontario science curriculum: Growth and Changes in Plants; Soils in the Environment; Forces Causing Movement; and Strong and Stable Structures (Ministry of Education of Ontario, 2007) were embedded into writing instruction, as well as within students’ written compositions.

Self-assessment is a formative assessment process in which students reflect on the quality of their work, judge the degree to which their work reflects explicitly stated goals or criteria, and revise their work (Wiggins & McTighe, 1998). Self-assessment can be used to assess written works in progress in order to find ways to improve performance (Andrade, 2008). Within this study, self-assessment was utilized by students to judge the quality of their written work. Students then used their self-assessments to revise and edit their written work in order to improve its overall quality.

Outline of the Remainder of the Study

Chapter Two of this study presents literature and research that are relevant to the exploration of writing instruction and development. The review of literature examines six

distinct areas of research and demonstrates the need for further study in each of these domains. The literature review begins with an examination of the theoretical framework that supports this study. This review then features an examination of the orthographic stages of writing development through which children progress as they acquire writing skills and strategies. The second section of the review provides a synopsis of writing pedagogy and curriculum, including an examination of the forms and traits of writing. The review continues with a discussion of curriculum integration, with a particular focus on the integration of literacy practices within the content areas (i.e., science). The third section of the review presents research surrounding assessment strategies, with a focus on self-assessment. The final piece to the literature review presents background information on the student reflection process, as well as teachers as reflective practitioners. This literature review highlights the need for further study in all areas of writing instruction and assessment.

Chapter Three of this study outlines the research methodology and procedures used for collecting and analyzing qualitative and quantitative data. The selection of the participants and protocols of this investigation are also identified. The limitations of this study, as well as strategies for establishing credibility are outlined in this chapter. Chapter Three concludes with a restatement of the problem.

Chapter Four presents the findings of this study by identifying the major themes that emerged from the analysis of the data. The themes are organized under specific headings, based upon the results of the qualitative and quantitative data.

Chapter Five opens with a brief summary of this research study. The chapter then proceeds with a discussion of the research findings as they relate to the background of the

problem, research questions, and review of literature. Implications for practice, theory, and further research are discussed at the conclusion of this chapter.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

This chapter provides a summary of literature that is relevant to this study of writing instruction and assessment. The literature review opens with an examination of the theoretical principles that frame this study. The review continues with a description of the stages of writing development through which children navigate as they learn to become competent writers. The third section presents an overview of three specific models of writing instruction: process writing, trait-based instruction, and a genre-specific approach. The fourth section of this chapter provides background information on the development of an integrated curriculum program as well as the benefits of adopting cross-curricular connections, particularly as they pertain to science and literacy. The fifth section of this chapter features literature on the development and use of rubrics, as well as student self-assessment practices. Reflective practices on the part of students and teachers are examined in the sixth and final section of this review.

Theoretical Framework

This opening section of the review of literature provides an overview of educational theory as it applies to writing development and assessment processes in children.

Constructivism

This research study was supported by a constructivist theoretical approach to learning, which emphasizes authentic, challenging activities for students and teachers. John Dewey believed that the constructivist process begins with the knowledge that children possess as a result of their previous experiences (as cited in Beal et al., 2001). A connection must be established between students' existing knowledge base and the

material to be learned. Any new learning must then become a part of students' experiences and schemata (Beal et al., 2001). There exists a need for knowledge creation in which students are able to work with their ideas in a creative and productive manner (Zhang, Scardamalia, Lamon, Messina, & Reeve, 2007).

Social Constructivism

The goal of constructivism is to create a learning community that is closely related to the collaborative practices of the real world (Huitt, 2003). In a constructivist environment, students assume responsibility for their own learning, and they strive to develop metacognitive abilities to monitor and direct their learning and performance (Huitt, 2003). Moreover, when students and teachers work collaboratively in an authentic constructivist setting, students are able to bring their own framework and perspectives to a given activity (Huitt, 2003). In his writings, Vygotsky (as cited in McCown et al., 1999) stressed the importance of social interaction and mentorship on the development of higher level-thinking.

Vygotsky (as cited in Santrock, Woloshyn, Gallagher, DiPetra, & Marini, 2010) believed that children could develop and apply higher-level thinking skills through the determination of a learner's "zone of proximal development." The zone of proximal development is defined as "a range of tasks that are too difficult for children to master alone but that can be learned with guidance and assistance from adults or more skilled children" (Santrock et al., 2010). When guiding a learner through his/her zone of proximal development, it is important for the teacher or peer to scaffold tasks for the learner. Scaffolding, a technique also established by Vygotsky (as cited in Santrock et al., 2010), allows the learner and instructor to maintain an open dialogue while the instructor

determines the amount of guidance that is required by the student to successfully complete a learning task. The greater the learner's confidence level becomes on a given task or skill, the less support is provided by the instructor (Santrock et al., 2010).

In adhering to a constructivist model of learning, this study helped to present research in understanding the importance of students' identity construction for overcoming struggles in literacy motivation (Oldfather, 2002). One of the keys to understanding students' struggles in motivation lies in knowing how students construct a sense of self, how students adapt to the culture of the classroom, and how they construct identities as readers, writers, and thinkers (Oldfather, 2002). Thomas and Oldfather (1997) posit that not only are instructional practices and the acquisition of knowledge socially constructed, but assessment and evaluation "are [also] socially constructed, specific to particular situations, and subject to multiple interpretations (p. 108). As such, throughout this current study, students were provided with ample opportunities to self-assess their writing and to revise their written work in order to improve their performance. This self-monitoring process was implemented to assist students in becoming independent learners.

Experiential Learning

As students learn to self-assess and make decisions about their written work, they also begin to develop as experiential learners. Therefore, a second theoretical framework to this study was the theory of experiential learning (Kolb, 1984). Kolb's theory is based upon a four-stage learning cycle that highlights how one's experiences lead to reflective practices and the formation of concepts. These concepts are then used as guides for active experimentation and the development of new experiences (Kolb, 1984). The first stage of

the theory of experiential learning is known as *concrete experience*. In this stage, students are actively involved in a learning experience or event (Kolb, 1984). The second stage, *reflective observation*, occurs when students consciously reflect back on their experience (Kolb, 1984). *Abstract conceptualization* is the third stage of Kolb's (1984) theory and involves students' attempts to conceptualize a model or theory based on their experience. Finally, the fourth stage, *active experimentation*, sees students creating a plan for a new learning experience (Kolb, 1984).

According to Rogers and Freiberg (1994), who also support Kolb's (1984) experiential theory, learning is facilitated when students participate in the learning process and have control over the nature and direction of their learning. Throughout this current study, students had opportunities to reflect upon the writing instruction that was facilitated by the teacher-researcher. These student reflections were used as a tool to provide future instruction and learning opportunities tailored to the needs and interests of the students. Self-assessment and reflection are the principal methods of progress and change, and the development of metacognitive skills and an openness to change are crucial to the learning process (Rogers & Freiberg, 1994).

The Stages of Writing Development

This section provides a synopsis of the various orthographic stages of writing development through which children progress in order to acquire effective writing skills and strategies.

Many educational theorists and educators themselves believe that written language is at the peak of the language hierarchy (Calkins, 1994; Clay, 1975; Graves, 1994; Hughey & Slack, 2000; Johnson, 1993). Studies indicate that emergent writing

skills begin to develop long before children enter school (Dyson, 1988; Dunsmuir & Blatchford, 2004; Education Department of Western Australia, 1997; Fitzgerald & Shanahan, 2000; Johnson, 1993). For most children, the home is where their earliest literacy learning occurs (Dunsmuir & Blatchford, 2004). When children begin learning to write, they become increasingly aware of the nature of language processes; they develop a conscious awareness of the number of words in sentences and the number of sounds in words; and they learn how written language is mapped alongside spoken language (Johnson, 1993).

When comparing oral and written language, it is clear that writing is not simply oral language that has been written down. Although speech and writing draw upon the same grammatical system, they do so in different ways. Written language requires the production of text with an absent audience (Johnson, 1993). Thus, writing requires greater specificity and sense of audience than the spoken word, along with an understanding of such written language conventions as spelling, structure, and punctuation. Although theories on writing development are imprecise, the study of a child's orthographic development holds much interest among educational researchers (Dunsmuir & Blatchford, 2004).

The orthographic model of writing development is framed by a child's ability to develop letter recognition, phonemic awareness, and spelling patterns, as well as grammar and structure in writing. The orthographic perspective of writing development consists of five phases of writing through which one progresses as one learns to communicate using the written word. The first phase of writing development is designated as an *emergent writing* stage (Fitzgerald & Shanahan, 2000). Observational

studies of children's writing development reveal that their early writing is usually accompanied by talking and drawing (Dyson, 1988). Children usually use drawing and talk to support their early exploration and use of print, in order to help clarify their thinking and make meaning of text (Dyson, 1988). Having already secured a considerable understanding of speech, young children are beginning to come to terms with a new aspect of language; that of written symbols. In the emergent writing phase, children experiment with marks on paper, attempting to communicate a message while emulating adult writing (Education Department of Western Australia, 1997). Children in this phase understand that there exists a difference between drawing and writing, and attempt to use known letters or approximations of letters to represent written language (Education Department of Western Australia, 1997). Clay (1975) points out that when children explore written language, they usually play with basic graphic features such as the linearity of print. At this emergent stage of writing development, a child's written work is not readable by others, as children have not yet developed an understanding of sound-symbol relationships (Education Department of Western Australia, 1997).

Experimental writing is a second proposed phase featured on the continuum of writing development (Education Department of Western Australia, 1997). In this phase, children are cultivating awareness that speech can be recorded in the form of written symbols, and that written messages remain constant (Education Department of Western Australia, 1997). Children's writing has now evolved from scribble-like shapes to more advanced letter formations (Tice, 1992). Children also begin to develop an understanding of the directionality of print (i.e., left to right), as well as one-to-one correspondence between spoken and written words (Fitzgerald & Shanahan, 2000). Children continue to

apply this newfound knowledge to further experiment with letters and words in this stage of their writing development (Education Department of Western Australia, 1997).

Children are now beginning to develop an understanding of sound-symbol relationships in the experimental writing phase, and may represent words with one, two, or three letters (e.g., *DN* represents *down*; *BAB* represents *baby*; Education Department of Western Australia, 1997; Fitzgerald & Shanahan, 2000). Some children in the experimental writing phase may be able to provide an almost perfect match between letters and sounds as spelling attempts become increasingly meaningful for children (e.g., *kitn* represents *kitten*; *becoz* represents *because*); (Education Department of Western Australia, 1997).

The *early writing* phase of orthographic writing development sees children writing about topics that are personally significant to them (Education Department of Western Australia, 1997). That is, children are beginning to consider their intended audience, leading to more purposeful written compositions. Gradually, through exploration and experimentation, coupled with writing and reading experiences at home and at school, children elaborate and refine their previous forms of writing, and new forms emerge (Kamberelis, 1999). Although children have now developed some sense of sentence structure, it is still too demanding for them to deal with more than one or two elements of writing at a time (i.e., a child may be able to use appropriate spellings in his/her writing, but may struggle with the concept of punctuation; (Education Department of Western Australia, 1997). Children are now applying spelling strategies with greater ease in their compositions during the early writing phase, and can provide an accurate correspondence between letters and sounds (Fitzgerald & Shanahan, 2000). Children are also using visual- and meaning-based strategies in their spelling of words, including

knowledge of common letter patterns and critical features of words such as silent or double letters (Education Department of Western Australia, 1997).

There appears to be a considerable increase in children's writing output and ability from the early writing phase to the fourth phase, the *conventional phase* of writing development. A writer who reaches the conventional writing phase is now familiar with most aspects of the writing process, and is able to select forms of writing to suit different purposes (Fitzgerald & Shanahan, 2000). Writers may now possess control of punctuation, spelling, and sentence structure, but these skills may vary according to the complexity of the writing task (Education Department of Western Australia, 1997). In terms of spelling development, writers have now developed an awareness of the many patterns and rules that are characteristic of spelling, and can identify words that may be spelled incorrectly (Education Department of Western Australia, 1997).

In the final suggested stage of writing development, the *proficient writing* phase, writers have developed their own personal style of composing written texts, and are able to manipulate forms of writing to suit their purposes (Education Department of Western Australia, 1997). These writers have good control of spelling and punctuation, and are able to produce pieces that are cohesive, coherent, and satisfying (Education Department of Western Australia, 1997). The writer has now developed a higher-level awareness of his/her own comprehension and meaning production when engaged in the act of writing (Fitzgerald & Shanahan, 2000). Over the past several decades, effective instruction has been shown to enhance students' writing development (Calkins, 1986; Chapman, 2002; DeFoe, 2000; Graves, 1983; Murray, 1985). The journey through the stages of writing development is not an easy one, and it is, therefore, through focused, purposeful writing

instruction that children will glean the necessary skills and knowledge to become competent writers.

Models of Writing Instruction

This section presents an overview of writing pedagogy and curriculum that have predominated research and education in Canada and the United States. Particular attention is paid to the shift from the process model of writing instruction to trait-based and genre-specific models of writing instruction.

During the 1980s, it was the pioneering work of Graves (1983) and Calkins (1986) that ushered in the era of process writing instruction in elementary schools. Writing was promoted as a meaning-making process in which writers negotiate meaning along with the text they are creating (Flower & Hayes, 1981). This approach emerged as a series of recursive steps through which writers progress as they put pencil to paper.

The first stage of the writing process is called the *planning stage*, and involves the brainstorming and organization of ideas. The *drafting stage* follows, wherein the writer translates these ideas into a rough draft. Next, the writer reviews and rearranges the ideas and content of the writing during the *revising stage*. The fourth stage, known as the *editing stage*, requires the writer to make corrections to the spelling, grammar, and punctuation of the piece. Finally, the writer enters into the *publishing stage*, in which a final, good copy of the work is produced. It should be noted that not all pieces of writing will necessarily reach the publishing stage of the writing process. Teachers implement instruction during these stages through such practices as (a) conducting writers' workshops, (b) having students complete multiple drafts of their papers, (c) holding frequent individual and small-group conferences with students, and (d) encouraging peer

review of written products (Unger & Fleischman, 2004). Martin, Segraves, Thacker, and Young (2005) propose that as teachers introduce the stages of the writing process, children begin to understand the power of becoming a writer. Children also learn that writing is a process in which the writer makes mistakes and corrects the piece. As a result, young children learn that writers continually reflect upon their writing as they make corrections (Martin et al., 2005).

Graves (1983) focused on the notion that children can be “real writers” who experience writing as an ongoing cycle of steps that are used to hone meaningful written compositions. As such, the process approach promoted by Graves (1983) is student-centred and calls for teachers to support children as they move through the writing workshop process at their own rate and style. Calkins (1986) promoted the process model with a more structured notion of writing that emphasized the developmental nature of writing acquisition and a distinct role for teachers to support and guide students at different stages in their development. The influences of both Graves (1983) and Calkins (1986) were responsible for the process-writing revolution that quickly became the standard instructional model in elementary schools throughout North America. The focus of process-oriented writing instruction is to stimulate students to think about their writing and reflect on their ideas. Although some researchers feel it is debatable whether process-oriented instruction may contribute to better writing in all students (Ho, 2006), others believe the use of techniques such as planning and preparation of more than one draft is in fact related to improved performance in students’ written work (Martin et al., 2005).

Even as process writing became the instructional norm in classrooms, other voices from broader perspectives drew attention to what may constitute effective writing

instruction. One representative voice was that of Tompkins (1990, 1994, 2000), who fully embraced the process-writing model, but argued that this approach was not sufficient on its own. Tompkins (1990, 1994, 2000) stressed the need for equal attention to the process and the product in writing, and directed teachers to attend to the instruction of traditional writing skills (e.g., focus on the conventions of writing such as spelling, grammar, and punctuation) along with the writing process. This call for a more balanced approach to writing instruction, one that addresses both process and product, has continued into the new millennium, and is now a popular focus in schools (Dorn & Soffos, 2001; Hughey & Slack, 2000).

Trait-Based Writing Instruction

The traits of writing were developed in the early 1980s by a group of teachers who were concerned about the quality of writing instruction and assessment in the United States (Higgins, Miller, & Wegmann, 2007). These teachers felt that assigning a single, subjective score to a piece of writing was not effective in accurately measuring a student's writing proficiency (Higgins et al., 2007). This necessitated the development of a scoring instrument that would provide accurate, reliable feedback to students, and would also assist teachers in guiding and refining their writing instruction (Northwest Regional Educational Laboratory, 2004). After evaluating thousands of papers at all grade levels, this group of teachers identified six common characteristics of good writing: (a) ideas, (b) organization, (c) voice, (d) word choice, (e) sentence fluency, and (f) conventions (Northwest Regional Educational Laboratory, 2004). *Ideas* indicate the purpose for writing and the message that is conveyed by the writer. *Organization* involves the internal structure of the writing. *Voice* is the personal tone and style of the

writer. *Word choice* implies words the writer has chosen to effectively convey the meaning of the writing. *Sentence fluency* is the flow of the writing. Finally, *conventions* indicate the mechanical correctness of the writing, in terms of spelling, grammar, and punctuation. These characteristics became the framework for the six-trait analytical writing model. The Northwest Regional Educational Laboratory (NWREL) used these components as the foundation for the six-trait writing assessment model, and as a basis for descriptive criteria to define the qualities of good writing (Higgins et al., 2007).

Attention to standards in writing performance and assessment had clearly gained ground with the development of the trait-based model of writing instruction. The educational reform movement of the 1990s placed a great deal of attention on students' language development and the need for rigorous standards and clear descriptions of what it means to be a proficient writer (Strickland et al., 2001). Consequently, there has been a resurgence of interest in models of writing instruction and assessment that clearly define the components of good writing, including trait-based models of instruction. One such writing program, produced by Spandel and Hicks (2002), has emerged as a popular example of an analytical trait-based writing program, providing focus and direction for writing instruction. Spandel and Hicks (2002) stress that this six-trait writing program is not intended to replace the process approach to instruction, but rather to enhance it. According to Spandel and Hicks (2002), the use of this program alongside the writing process approach will provide teachers with a structure that allows for writing success among children. The traits of writing allow for teachers and students to identify the strengths and weaknesses in a composition, in order to help students navigate through the writing process (Culham, 2003). Through trait-based instruction, assessment is embedded

within the writing curriculum as a tool for revision. The traits of writing are most effective when they are integrated within classroom writing workshop (a forum for writing instruction and independent student writing time), and the writing process is enhanced when all traits are incorporated within this forum (Higgins et al., 2007). The use of the traits can help teachers and students become reflective learners using a common vocabulary that enables them to talk about writing (Higgins et al., 2007). In fact, according to Culham (2003), trait-based vocabulary should be used by teachers to convey their vision of good writing to students. Incorporating trait-based instruction into a writing program may be a means for students to become fluent, independent writers.

Over the past decade, the popularity of the six-trait analytical model has grown among educators in North America. Teachers are now refining their writing instruction to incorporate trait-based lessons. According to Farris (2008), these lessons should be introduced in a specific order within an instructional year, based on the complexity of the trait.

Since students are developing as writers, it is best to begin with the traits of ideas and organization before progressing to sentence fluency and word choice. Since voice is often difficult for elementary students to grasp, it should be one of the later traits introduced. Obviously, the use of conventions as part of the revision process and the consideration of how the written piece is to be presented provide the final touches. (Farris, 2008, p. 17)

As Farris presents a sound instructional model for introducing the six traits of writing, the teacher-researcher adopted this model as part of this current study.

Interestingly, there is a lack of rigorous experimental research surrounding a trait-based instructional approach (Morawek & Gallagher, 2007). Many classroom teachers provide testimonials and unsolicited data with respect to the efficacy of the six-trait analytical model, but there is little research data to support this program's overall effectiveness (Morawek & Gallagher, 2007). There also exists a general void in educational research on the effects of an integrated approach to writing instruction on elementary students' learning (MacArthur et al., 2006).

Genre-Specific Writing Instruction

During the late 19th century, U.S. and Canadian elementary schools did not teach writing composition; rather, writing instruction involved teaching students to form letters, to spell words, and to develop legible handwriting (Education Encyclopedia, 2008). However, in 1873, Harvard University assigned a writing requirement to its admission's process, revealing a need for explicit instruction in the forms of writing (Education Encyclopedia, 2008). Other colleges soon followed suit with similar requirements, and high schools also began to prepare students to fulfill these expectations (Education Encyclopedia, 2008). Writing continued to have a place in the secondary curriculum throughout the 20th century; however, it was not until the mid-20th century that the forms of writing began to find a place in elementary schools (Education Encyclopedia, 2008). It was in 1966, following the Dartmouth conference (a forum in which British and American English specialists would come together), when educational leaders began to realize that learning to write held as much importance as learning to read, and should, therefore, be explicitly taught from a young age (Education Encyclopedia, 2008). The forms of writing are now taught in schools world-wide, although "few published quasi-

experimental or experimental studies exist on the impact of genre instruction on elementary school children's writing in a range of genres (MacArthur et al., 2006, p. 138).

The forms or genres of written language are differentiated and identifiable written text types (Purcell-Gates, Duke, & Martineau, 2007). The social semiotic view of language considers genres as socially-constructed language practices, reflecting community norms and expectations (Purcell-Gates et al., 2007). Thus, the forms of writing are also designed to serve social purposes that are situated within sociocultural contexts (Purcell-Gates et al., 2007). Writing instruction, and more specifically instruction in the forms of writing, is embedded in the theory of social constructivism. "Genres work to order the world, to constitute persons and social formations, [and] to typify both construals of what is going on and means of moving forward" (MacArthur, Graham, & Fitzgerald, 2006, p. 132). Research on the various forms of writing can provide important information about how young children learn to write in different contexts (Chapman, 2002). Researchers of young children's writing have found that the learning of various writing forms is an integral part of a child's literacy development (Chapman, 2002). A genre-focused approach to writing highlights the purpose for writing, the structure and language features of each form, and the processes involved in writing (Education Department of Western Australia, 1997). However, there is strong evidence to suggest that young children acquire only those forms to which they are exposed and are given opportunities to use in their writing (Chapman, 1995; Donovan, 2001; Kamberelis, 1999; Wollman-Bonilla, 2000). According to the Ministry of Education of Ontario (2005a), there exist six specific forms of writing that teachers

should address in their classrooms (e.g., narrative, recount, procedure, report, persuasive, and explanation). Unfortunately, elementary teachers continue to rely on only a few of these genres as part of their writing instructional program (Wollman-Bonilla, 2000).

According to Chapman (2002), despite the critical importance of non-narrative forms of writing, schools have been ineffective in developing children's writing abilities in a variety of curriculum genres, creating an "expository gap" by the time a child reaches grade 4. Genre theorists argue that narrative forms of writing are favoured in schools where reading is taught using fictional literature (Gambell, 2001). When this is the case, students are then unfamiliar with or incapable of writing in other forms. Genre-based writing will not develop naturally and, thus, needs to be taught systematically and explicitly (Chapman, 2002). Genreists (educational researchers who study genre theory as it relates to literacy) feel that by not teaching the forms and structures of the various academic genres, students are denied choice in their writing, thus limiting their knowledge of language forms appropriate to different given situations (Purcell-Gates et al., 2007).

Studies have indicated that there is typically more fiction than nonfiction literature presented to students in primary classrooms, yet children can readily understand expository vocabulary, and they have a natural curiosity for many nonfiction forms of writing (Purcell-Gates et al., 2007). Educational researchers also feel there is a strong link between reading and writing nonfiction text (Graves, 1994). "Nonfiction is the genre that will dominate most children's school and vocational careers. It is an important medium of thought in which children learn to discover how they feel and what they think about certain subjects and issues" (Graves, 1994, p. 324). A survey of the 50 U. S. states

revealed that most American standardized tests require students to write in a variety of specific forms (i.e., narrative, explanatory, persuasive, and/or report writing) in response to specific prompts (Higgins et al., 2007). All Canadian provinces and territories, aside from Prince Edward Island and Nunavut, also require elementary and secondary students to complete standardized tests featuring specific literacy components (Airasian, Engemann, & Gallagher, 2007). If students are given daily opportunities to write meaningful texts in a variety of narrative and expository forms, not only will their performance improve in an academic setting, but in the real world.

There is no question that skilled writing is a highly sophisticated task that involves generative thought processes that must be sensitive to the needs and expectations of an audience. To communicate effectively, writers must achieve focus, clarity, and coherence using a suitable style, a meaningful organizational plan, and appropriate conventions (Henk, Marinak, Moore, & Mallette, 2004). In addition, skilled writers require facility with a wide range of forms and accompanying purposes (Henk et al., 2004). Genre-specific writing lessons, along with the process model of writing instruction and trait-based writing instruction, will all help to serve students in becoming competent writers.

Integrated Curriculum

This section defines integrated curriculum and provides background on this interdisciplinary teaching strategy. This section also describes the link between science and literacy as it relates to an integrated approach to reading and writing instruction.

The Ontario Elementary Curriculum (JK-8) contains a vast and extensive array of expectations across various subject areas (Ministry of Education of Ontario, 1998a;

1998b; 2004; 2005b; 2006; 2007). These subject areas include *Health and Physical Education* (Healthy Living, Fundamental Movement Skills, Active Participation); *The Arts* (Visual Arts, Dramatic Arts, Music); *Social Studies, Grades 1-6* (Heritage and Citizenship, Canada and World Connections); *Mathematics* (Number Sense and Numeration, Measurement, Patterning and Algebra, Geometry and Spatial Sense, Data Management and Probability); *Language Arts* (Reading, Writing, Oral and Visual Communication, Media Literacy); and *Science and Technology* (Understanding Life Systems, Understanding Earth and Space Systems, Understanding Matter and Energy, Understanding Structures and Mechanisms). With such a plethora of objectives to be covered over the course of a school year, teachers are faced with obstacles in effectively implementing the curriculum. These obstacles might include a lack of resources, lack of administrative and/or parental support, or varied levels of learning and achievement among students in a given classroom (Harvey & Reid, 2001). However, the biggest challenge for educators in effectively adhering to and fulfilling the requirements of the Ontario curriculum is time management (Compton, 2002). A solution for the time constraints that educators face in implementing the curriculum is to develop an integrated program, through cross-curricular connections within subjects and strands.

The process of making connections among subject areas and disciplines of study is called curriculum integration (Compton, 2002). When curriculum integration occurs in parallel or in collaboration with other subject disciplines, a synergistic effect occurs: students begin to make meaningful connections between specific areas of study, and form a more holistic approach to knowledge-building (Compton, 2002). According to Jacobs (1989), carefully designing a set of organized experiences within a range of disciplines

enhances students' learning. Integration among subject areas helps students to see the natural relationships among these areas, and, in turn, assists students in making meaningful connections with the real world.

The concept of curriculum integration is not a new one. This process can be traced back to Herbert Spencer in the 1800s, through to national curriculum reforms in the 1930s and 1940s, to the contemporary research of curriculum integration in the 1980s (Harvey & Reid, 2001). Thus, the retreat from subject-centered approaches of curriculum organization towards more progressive interdisciplinary or integrated curricula seems to have occurred in a pendulum-like fashion over the course of the 20th century. In particular, John Dewey was an unremitting advocate for curriculum integration (as cited in Carr, 2007). Dewey's antipathy to a traditional subject-centered curriculum, and his corresponding sympathy for more integrated approaches to the organization of learning, is derived from the notion that information should not be presented as discrete bodies of knowledge (as cited in Carr, 2007). According to Dewey, information that is presented in separate compartments paints a misleading picture of reality (as cited in Carr, 2007).

Knowledge is a holistic concept, as all knowledge and learning are significantly interrelated. A complex understanding of life itself is vitally important to develop mastery in even a single discipline, but greater creativity and wisdom occur when students learn in wholes, and not simply in parts (Compton, 2002).

In wider curricular terms, it is not hard to see how one might well need some geography in order to understand some history, or how one's understanding of dance might be seriously hampered by a total ignorance of music or literature.

(Carr, 2007, p. 9)

Research shows that students increase their knowledge base and retain information for a greater length of time when ideas from different subject areas are connected (Yager, McClure, & Weld, 1993).

Drake and Burns (2004) posit that with the advent of the “new” Ontario curriculum, introduced in 1998, teachers despaired that developing an interdisciplinary approach to instruction was unrealistic. Years later, teachers are now coming to terms with the demands of the Ontario curriculum, and a renewed interest and enthusiasm for integrated curriculum is presenting itself (Drake & Burns, 2004). Teachers are coming to realize that they can chunk the curriculum expectations together into “meaningful clusters both within and across the curriculum” (Drake & Burns, 2004, p. 2). Some schools are now creating interdisciplinary teams to enhance the integration of writing activities in particular, across the curriculum (Education Encyclopedia, 2008). The Writing-Across-the-Curriculum (WAC) program advocates a multidisciplinary approach to instruction, so that students might see their learning as a unified experience (Couch, as cited in Gribbin, 1991). This program is an instructional approach in which writing is used as a tool for thinking and communicating across all subject areas (Gribbin, 1991). Teachers who adopt the WAC pedagogy have embraced writing across all disciplines as a means of enhancing the thinking and learning of students (Gribbin, 1991). With such approaches as Writing-Across-the-Curriculum being implemented by teachers, the pendulum-like shift in the use of integrated curriculum is coming to an end (Drake & Burns, 2004). Drake and Burns (2004) “predict that slowly and surely interdisciplinary approaches will expand to become a norm rather than an anomaly” (p. 146).

Unfortunately, although there appears to be a recent shift in the use of integrated instructional strategies in classrooms, the teaching of content-area subjects as individual, unconnected compartments has been the tradition among many teachers (Harvey & Reid, 2001). “Educators have been programmed to turn on one subject for an hour, switch to another, and then turn to [yet] another [subject]” (Harvey & Reid, 2001, p. 605).

Therefore, traditional treatments of the integration of curriculum have focused on ways to help children read content-area (i.e., science, social studies, mathematics) textbooks, rather than creating a clear and purposeful link among specific disciplines (Shanahan & Robinson, 1993).

Customarily, educators have not considered science instruction as a setting for literacy learning (Hapgood & Palincsar, 2007). However, inquiry-based science instruction can provide a rich context in which to develop and build upon literacy skills (Hapgood & Palincsar, 2007). Students are typically curious about the world around them and are eager to talk, read, and write about what they are learning. Science and literacy intersect when students use reading, writing, and oral language to address questions about science content and to build their capacity to engage in scientific reasoning (Hapgood & Palincsar, 2007). Linking hands-on science instruction with the literacy curriculum is growing in appeal, particularly in light of the fact that the United States’ “No Child Left Behind Act” now mandates that students be assessed in science for the first time (Lundstrom, 2005). The Programme for International Student Assessment (PISA), a worldwide standardized assessment that measures the achievement of 15-year-old students in the areas of science, mathematics, and reading, also reveals a need for high quality integrated instruction (Organisation for Economic Co-operation and

Development, 2006). In 2006, on the most recent administration and analysis of PISA, only 3% of Canadian students scored a Level 6; the highest proficiency level on this assessment (Organisation for Economic Co-operation and Development, 2006). These data illustrate a need for integrated instruction, in order to assist students in becoming effective literacy and content area learners.

According to Miller (2007), “integrative science and literacy experiences are essential to developing students’ capacities in both science and literacy” (para. 3). Reading and writing instruction, in particular, are more meaningful to students when embedded within a content area, such as science, than when performed as separate skills that lack a clear purpose (Block & Mangieri, 1997; Goldman, 1997; National Reading Panel, as cited in Miller, 2007). Content area classrooms are ideal for assisting students in developing as writers and content learners (Peterson, 2007). The integration of writing within science learning, as well as other curricular areas, highlights the significance of writing in one’s daily life, and deepens students’ content learning and their motivation to construct knowledge (Peterson, 2007). “The integration of science and writing provides a real-life forum for students to become better writers of a wide variety of genres” (Peterson, 2007, p. 32). The discussion of how best to teach science and promote literacy in science has now taken on new urgency among Canadian and American educators.

In a case study of three primary teachers (Waldrip, 2001), it was found that teachers’ approaches to linking science and literacy vary greatly, based on their perceptions of what an integrated curriculum actually entails. The first teacher in Waldrip’s (2001) study viewed literacy and numeracy instruction as forming the basis of all learning. This teacher did not question the fact that a 2-hour literacy block be used

exclusively for language work, regardless of other key subject areas and disciplines (Waldrip, 2001). This teacher believed that he operated under the auspices of an integrated curriculum, but saw no anomalies in the fact that numeracy and literacy were largely exclusive of other curriculum areas (Waldrip, 2001). He did not appear to make a conscious link between the teaching of science and literacy. The second teacher in Waldrip's (2001) case study viewed the integration of science with literacy as a meaningful way to expose children to a variety of writing forms. This educator felt that in classrooms where curriculum subjects were taught in isolation, children's writing was often restricted to narrative pieces, but with the integration of science and literacy, students would have the opportunity to engage in new forms of writing that follow frameworks quite dissimilar from that of a narrative framework (i.e., procedural writing, report writing, explanatory writing; (Waldrip, 2001). The second teacher in the case study also felt that there exists a natural integration between literacy and science, and that a child's reading, writing, and oral language development can benefit from the blending of subject boundaries (Waldrip, 2001). The third teacher in Waldrip's (2001) study stressed the importance of looking at an academic day as one whole unit of time, and not as a rigidly operated timetable broken into small compartments. She believed that teachers who treated literacy and numeracy as blocks of time that were untouchable, would eventually come to the conclusion that there were not enough hours in the day to meet curriculum expectations (Waldrip, 2001). Clearly, educators differ in their views of curriculum integration. For this reason it is hoped that this research study will help to shed some light on the benefits of cross-curricular connections not only for classroom teachers, but for students.

Rubrics as Writing Assessment Tools

This section examines rubric development and application as a writing assessment tool for teachers and students. This section also presents literature on student self-assessment as a means of supporting and empowering students to improve their writing.

Rubric Development

In a never-ending search for “best practices,” elementary classroom teachers are deluged with information surrounding effective assessment tools. Often there is a lack of time to thoroughly explore and compare different methods of assessment (Morawek & Gallagher, 2007). In addition to this, assessment of students’ writing performance is often subjective and inherently inconsistent among individuals who are grading student writing (Culham, 2003). To reduce teachers’ misuse and misinterpretation of writing assessment measures, teachers must be provided with assessment standards and tools that are easily identifiable, and can be applied to every student in accordance with specific instructional objectives (Banks, 2005); rubrics are particularly effective for this purpose (Linn & Miller, 2005).

A rubric is typically created, containing the essential criteria for a given task and appropriate levels of performance for each criterion (Mueller, 2006). Analytic rubrics, in particular, focus on specific characteristics, and pinpoint the strengths and weaknesses of a product, built upon explicitly delineated criteria (Linn & Miller, 2005). A student's achievement on a task is determined by matching the student's performance against a set of criteria, to ascertain the degree to which the student's performance meets the criteria for the task (Linn & Miller, 2005). The criteria are assessed separately and then

amalgamated with the scores from other components of the rubric to derive an overall grade.

Rubrics are of interest to teachers and students for many reasons. First, they are powerful tools for both instruction and assessment (Goodrich, 1997). Rubrics can help to monitor and improve student performance by providing students with clear expectations, and by showing them how to meet those expectations (Goodrich, 1997). Rubrics are also useful as they help students to become more thoughtful judges of the quality of their work (Goodrich, 1997). Rubrics are typically uncomplicated in their use and, if developed properly, provide a clear indication of a student's ability level. The goal of an assessment tool, such as a rubric, is to establish a substantive degree of reliability in the application of such a tool. Reliability and validity are concerned with the consistency and accuracy of the judgments we make about students and their work (Payne, 2003). A rubric must be aligned with reasonable expectations and with the curriculum being taught in order to be valid (Payne, 2003).

By enlisting the support of colleagues, teachers can improve the reliability of their evaluations of student writing through the use of rubrics, as assessing students' writing compositions requires a degree of evaluative judgment (Aiken, 2000). For example, teachers may ask other teachers to grade one or more compositions from students in their classrooms, and then compare this grading (Morawek & Gallagher, 2007). Teachers can also receive collaborative professional development in the application of grading criteria. This should lead to higher rates of agreement among different graders with the accompanying likelihood that the rubric will be more reliably applied in assessment (Payne, 2003). This is especially important for the reliable application of analytic rubrics.

As an illustration, a group of primary-level teachers was trained to interpret the scoring criteria on an analytic writing rubric. These teachers graded written compositions more consistently than untrained teachers (Stuhlmann, Daniel, Dellinger, Denny, & Powers, 1999). Specifically, teachers who received training in the use of a writing assessment rubric tended to be more uniform in their interpretation of criteria within the rubric (Stuhlmann et al., 1999). However, teachers should not lose sight of the fact that reliable assessment is not necessarily valid assessment (Morawek & Gallagher, 2007). The assessment task must be meaningful, in order to draw worthy conclusions. Furthermore, writing assessment should be ongoing and reflective of classroom writing instruction over a period of time; this is a reflection of instructional validity (Aiken, 2000).

Recently, teachers have seen the benefits of assessment informing instruction (Stead, 2002). Unfortunately, teachers typically provide children with demonstrations and writing instruction based on what they *think* students need, and not on what they *know* is needed by students (Stead, 2000). Therefore, what is required is an assessment rubric, or a series of rubrics, that identify the key skills and understandings (i.e., the forms and traits of writing) that children need when producing different written compositions such as narrative and expository works (Morawek & Gallagher, 2007). These rubrics can then be used as formative and summative assessment tools to assist teachers in identifying the success or next steps of instruction in order to enhance student learning (Airasian et al., 2007). Formative assessment tools, such as rubrics, can also be used to support students during knowledge construction, by having students conduct self-assessments of their

work. This may help to “provide insights into how students are interpreting their own learning” (Airasian et al., 2007, p. 74).

Self-Assessment and Student Learning

Assessment and evaluation are typically employed by educators to provide diagnostic, formative, and summative feedback of students’ knowledge base and learning. Recently, it is not only assessment practices that have gained popularity among educational theorists and researchers, but, more specifically, the use of student self-assessment in the classroom. Some of the earliest reported research on student self-assessment can be traced back to the 1930s, although then, much of the focus of this assessment strategy was primarily on making comparisons between marks that students had assigned themselves against marks assigned by the classroom teacher (Tan, 2008). However, over the past 15 years there has been significant interest in the notion of involving students in assessment (Tan, 2008).

Self-assessment involves having students make judgements about their own learning (Andrade, 2008; McFayden, 1997; Pope, 2005; Tan, 2008). During self-assessment, students reflect on the quality of their work, judge the degree to which it mirrors explicitly stated goals or criteria, and revise their work based on their own assessment (Andrade, 2008). According to Andrade (2008), many teachers are hesitant to adopt the practice of student self-assessment in their classrooms. These educators feel that students will simply assign themselves the highest score possible, in order to make little or no revisions to their work (Andrade, 2008). This would ultimately defeat the purpose of self-assessment. However, self-assessment is a critical ingredient in helping students to develop essential metacognitive skills and to become lifelong learners.

Students simply need to be taught to understand the value of self-evaluation and how to conduct self-assessments (Andrade, 2008). With appropriate teacher support, students can learn to accurately self-assess and effectively revise their work.

In an article by Rief (1990), she posits that educators should not be the sole assessors of students' work, particularly in the areas of reading and writing. Rief (1990) feels that it is extremely important to allow students to self-assess their writing, so that they can develop an increased awareness of their own writing processes. Prior to evaluating students' written work, "teachers must first listen to the perceptions that students have of themselves—and address what they think they can and cannot do" (Rief, 1990, p. 27). According to Rief (1990), when students are given opportunities to self-assess their writing performance, students become increasingly engaged during writing instruction and their vocabulary and written communication skills improve.

Clearly, there are numerous advantages to actively including students in the assessment process. Pope (2005) suggests that the advantages of self-assessment relate directly to student involvement, independence, and assertiveness. Educational theorists also suggest that student self-assessment can contribute to feelings of control, choice, agency, and self-worth over one's learning (Brookhart, Andolina, Zuza, & Furman, 2004). According to McFayden (1997), self-assessment is a more constructive approach than performance-based assessment, as self-assessment promotes individual excellence and creative diversity. When engaging in self-assessment processes, students may learn, understand, and change their work behaviours by continuously examining, hypothesizing, theorizing, and reflecting upon their work (McFayden, 1997).

Reflective Practices of Students and Teachers

This section offers information on the reflective practices of both students and teachers. In particular, there is a focus on the use of reflection to help inform and drive effective instruction and assessment.

Student Reflection and Self-Perception

Self-reflection provides a powerful mechanism for students to communicate, demonstrate, and express their curricular knowledge (Lane et al., 2008). If students are to self-assess their work in order to improve the quality of their writing, this requires students to expand upon their knowledge of writing traits and forms, as well as the writing process. Self-reflection can assist students in examining the overall content of their writing, in order to effectively revise and improve their written work. Ultimately, when students reflect on their writing experiences and completed compositions, they generally produce better products (Davis, 2000). The involvement of students in authentic decision making processes through reflection will also allow them to access their thinking about their place in the learning framework (Munns & Woodward, 2006).

The process of reflection on ideas motivates students to revisit, test, and reformulate the links and connections among their ideas, leading to a more coherent, integrated understanding of the content of their work (Davis, 2000). Even primary students are capable of engaging in reflective practices, but many of these students require scaffolding in the form of specific prompts to assist them in effectively recording reflections (Davis, 2000). Teacher prompting can help students to become autonomous integrators of their knowledge (Davis, 2000).

In order for students to engage in reflection, it is also necessary that they possess the vocabulary that will enable them to talk about both the curriculum and their learning

(Munns & Woodward, 2006). Over a period of 10 weeks, Munns and Woodward (2006) investigated the reflection and self-assessment abilities of grade 4 students. Following classroom lessons and activities from a variety of subject areas, the grade 4 students were given post-it notes to record written reflections under one or all of the following headings: “What I learned;” “What I liked;” “What I didn’t like;” and “What I want to know” (Munns & Woodward, 2006). The students’ post-it notes were then placed on a chart paper for the rest of the class to observe (Munns & Woodward, 2006). This allowed individual students to not only reflect upon their learning, but to also share their metacognitive processes with their peers (Munns & Woodward, 2006). Munns and Woodward (2006) collected and analyzed qualitative data in the form of observational fieldnotes, interactions with the students, and students’ written reflections. The researchers’ findings indicate that through specific reflective practices, students can become thoughtful, confident learners (Munns & Woodward, 2006). For this reason, all students will be given the opportunity to reflect upon classroom writing instruction, self-assessment practices, and their written compositions, at various points throughout this study.

The Reflective Practitioner as a Means of Refining Teaching Practice

Teaching is a complex and involved process that is determined by one’s knowledge and understanding of the curriculum, as well as appropriate skills and attitudes for working with students (Thornton, 2005). Reflective teachers acknowledge the complex and problematic nature of teaching and systematically reflect upon their practice in order to improve it (Thornton, 2005). Reflective practice is defined by Schon (1984) as the thoughtful consideration of one’s experience in applying knowledge to

practice. Schon (1984) believes that the idea of reflective practice is a critical process in refining one's own artistry or craft in a specific discipline.

Over the past 20 years, the notion of teacher reflection or the *reflective practitioner* has grown in popularity in educational circles (Boody, 2008). Teacher reflection often falls into one of four categories: retrospection, problem solving, critical reflection, or reflection-in-action (Boody, 2008). Schon (1984) advocates for reflection-in-action as the key ingredient in enhancing one's teaching practice.

When someone reflects in action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case. His enquiry is not limited to a deliberation about means, which depends on a prior agreement about ends. He does not keep means and ends separate, but defines them interactively as he frames a problematic situation. (Schon, 1984, p. 15)

Clearly, reflection-in-action is more than simply looking back on an incident or series of episodes in the classroom. The focus of reflection-in-action is reflection that is undergone to bring about positive change in one's teaching practice (Boody, 2008). According to Boody (2008), the motive for such reflection is the obligation that an educator feels to one's students and to his or her own values as a teacher and a human being.

Teacher reflection can take many forms, and may vary depending on the goals and setting of the reflective practice (Tigelaar, Dolmans, Grave, Wolhagen, & Van der Vleuten, 2006). Teaching portfolios are frequently used to stimulate reflections on teaching, and can be used to emphasize teaching behaviours and competencies (Tigelaar et al., 2006). Portfolios are increasingly being used as tools to contribute to the

development and growth of individual teachers, and to the improvement of the teaching profession as a whole (Tigelaar et al., 2006). Recording one's thoughts in notebooks, journals, and diaries is also effective in promoting reflection (Richardson & Maltby, 1995). The exercise of reflection using these tools is seen to promote qualities and skills such as open-mindedness, motivation, self-awareness, and problem solving, which are necessary in effectively engaging in the reflective process (Richardson & Maltby, 1995).

According to Johns (2004), it is through the reflective moment that educators seek and gain insight into new and improved instructional methodologies and assessment practices. Reflection is meant to open one's eyes to personal and professional decisions and practices. Moreover, becoming a reflective practitioner offers the greatest hope for personal and professional maturity and growth (Johns, 2004). Through reflection, teachers can ultimately hone their instructional and assessment practices, helping students to reap the benefits of this introspective act.

Chapter Summary

Writing is an integral form of communication for students to master, particularly in today's print-filled society. It is, therefore, imperative that educators provide the best possible writing instruction and assessment opportunities for their students. A multifaceted writing instruction program that includes specific forms and traits of writing, as well as the process model of writing, are necessities in today's classrooms. The literature presented above provides educators with research-based evidence that an integrated writing program that not only includes specific forms and traits of writing, but involves making cross-curricular connections with other core subject areas (i.e., science), is crucial in enhancing students' writing performance and content learning. In this

literature review, evidence was also provided that suggests students should not only have opportunities to utilize various forms and traits of writing within specific content areas, but should be active participants in the assessment of their writing. Thus, the primary purpose of this study was to investigate the effects of an integrated writing program on grade 3 students' writing performance. A second goal of this study was to examine the impact of student self-assessment, using either teacher-created or student-generated writing rubrics, on students' performance as young writers. It is believed that by introducing a writing program to students that integrates specific traits and forms of writing within a specific content area (i.e., science), and by allowing students to assist in the development and application of writing assessment tools, that students will see gains not only in learning to write, but in writing to learn.

CHAPTER THREE: METHODOLOGY AND PROCEDURES

Research is a systematic process in which information is collected and analyzed to gain an understanding of a specific topic or issue (Creswell, 2008). Education, both as a focus of study and as an organizational function, is central to research in the social sciences (Social Science Research Council, 2008). The need for empirical interdisciplinary and interpretive disciplinary-based educational research is in fact grounded in the social sciences (Social Science Research Council, 2008). All research in the field of education must possess certain common characteristics, and typically follows a series of six specific steps. These steps include (a) identifying a *research problem*; (b) conducting a *review of literature*; (c) determining a *purpose for the research*; (d) *collecting data* to support and answer research questions; (e) *analyzing and interpreting data*; and (f) providing an *evaluation* of the research based on the data (Creswell, 2008). Although the steps in conducting educational research remain consistent, the structure of research can take on a variety of forms (Wiersma & Jurs, 2005). As such, this study took the form of a mixed methods design.

Research Design

There are several benefits to using a mixed methods research design. Using both quantitative and qualitative data collection methods allows the researcher to capitalize on the assets of both methods and will likely appeal to a wider audience (Wiersma & Jurs, 2005). According to Wiersma and Jurs (2005), the most compelling reason for using a mixed methods approach to research is that this design can address a multitude of research questions that are both quantitative and qualitative in nature.

A mixed methods design typically includes the collection of both quantitative and qualitative data. This mixed methods study adhered to a quasi-experimental design. Due to the nature of this study, the participants were members of two intact classes. A quasi-experimental design allows for the use of intact groups within this study (i.e., two grade 3 classes) rather than a random assignment of participants (Creswell, 2008).

The qualitative aspect of this mixed methods study included an action research design. For practitioners, one of the purposes of action research is to implement and refine new instructional approaches through direct classroom application (Glass & Hopkins, 1996). The process of action research includes a continual disciplined inquiry that is conducted to inform and improve educational practice (Calhoun, 2002). Through action research, teachers and educational researchers study learning contexts within the classroom to identify research problems, explore professional development alternatives, and investigate the effects of instructional change on their practice (Calhoun, 2002). This form of professional learning is especially common in Ontario, where classroom teachers are increasingly viewed as the primary participants in their own growth (Auger & Wideman, 2000). In this way, teachers are able to employ action research methods to ask questions and investigate solutions that augment their professional knowledge and enhance their teaching practice (Auger & Wideman, 2000). The procedures detailed in this chapter were used to address the following research questions:

1. Does an integrated approach to writing instruction assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, word choice) of writing within science-based written compositions?

- Paired samples *t*-tests were conducted to compare the self-assessments of the experimental students' rough writing drafts and good copies of their writing, using the student-generated rubrics
 - Paired samples *t*-tests were conducted to compare the teacher-researcher's scores of the experimental students' rough writing drafts and good copies, using the student-generated rubrics
 - Paired samples *t*-tests were conducted to compare the self-assessments of the control students' rough writing drafts and good copies of their writing, using the teacher-created rubrics
 - Paired samples *t*-tests were conducted to compare the teacher-researcher's scores of the experimental group's pre- and posttest compositions, using the teacher-created rubrics
 - Paired samples *t*-tests were conducted to compare the teacher-researcher's scores of the control group's pre- and posttest compositions, using the teacher-created rubrics
 - A Pearson product-moment correlation coefficient *r* was used to determine the interrater reliability between the teacher-researcher and the teacher-participant
2. Is there a difference between the writing compositions of grade 3 students who have received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy) and the writing compositions of grade 3 students who have not received the science integration component throughout language arts instruction?

- Independent samples *t*-tests were conducted for the teacher-researcher's scores of the experimental and control students' posttests
 - Independent samples *t*-tests were conducted for the teacher-participant's scores of the experimental and control students' posttests
3. Can grade 3 students reliably self-assess their written compositions with student-generated rubrics?
 - A Pearson product-moment correlation coefficient *r* was conducted to compare the experimental students' self-assessments of their writing (rough and good copies) with the teacher-researcher's scores of their writing (rough and good copies), using the student-generated rubrics
 4. Can grade 3 students reliably self-assess their written compositions with predeveloped rubrics provided by the classroom teacher?
 - Pearson product-moment correlation coefficient *r* tests were conducted to compare the control students' self-assessments of their written good copies to the teacher-researcher's and teacher-participant's scores of the control students' good copies, using the teacher-created rubrics
 5. How aware are grade 3 students of the forms and traits of writing after receiving an integrated approach to writing instruction?
 - Teacher and student interviews, as well as teacher and student reflections were collected, coded, and analyzed
 6. How can grade 3 writers' self-assessments and reflections be used to guide teachers in their instructional decision making?

- Teacher and student interviews, as well as teacher and student reflections were collected, coded, and analyzed

Selection of Site and Participants

In action research, the researcher is only concerned “with a particular group in its entirety, such as a class, grade level, or school” (Mertler & Charles, 2005, p. 140).

Accordingly, the participants of this study were not randomly assigned, but were purposefully selected by the teacher-researcher as part of a *convenience sample*. Teachers often use convenience samples when conducting action research, selecting their own class as a sample, as well as the classes of fellow colleagues if necessary (Mertler & Charles, 2005). Through a convenience sample, the teacher-researcher used her own grade 3 class of 18 students (experimental group), along with the teacher-participant’s grade 3 class of 20 students (control group), for a total of 38 student participants in this study.

Teacher-Researcher

The teacher-researcher, who was also the principal investigator of this study, has been teaching for 10 years. The majority of her career has been spent teaching grades 2-4, although she has also taught grades 5 and 6, and has worked as an FSL (French-as-a-Second-Language) teacher and a Literacy Coach with JK-grade 8 teachers and students. The teacher-researcher has taught within two different school boards, but has spent most of her career with the school board in which she is currently employed. She belongs to the *International Reading Association* and the *Canadian Society for the Study of Education* and has presented posters and papers at their respective conferences. She was also involved in the Ministry of Education’s literacy development initiative to help

enhance boys' reading, writing, and oral communication skills. The teacher-researcher has presented numerous workshops to teacher candidates and in-service teachers in the areas of literacy, mathematics, differentiated instruction, and assessment. She also recently served a 1-year term as a council member for the Ontario College of Teachers. In 2004, the teacher-researcher began conducting an ongoing action research study with her grade 2 students on the forms and traits of writing. The results of this continued action research have lent themselves to several publications and conference presentations, and are the impetus for this current study.

The teacher-researcher was responsible for all writing instruction that took place with the experimental group. The teacher-researcher also provided the teacher-participant (see below) with all integrated writing lessons to be presented to students in the control group, with the exception of focused, content-specific (i.e., science) lessons integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy). These content-specific literacy lessons were only conducted with the experimental group. The teacher-researcher scored both the experimental and control groups' pre- and posttest written compositions using the teacher-created rubrics. She then scored the experimental students' rough drafts and good copies of their posttest compositions using the student-generated rubrics. The teacher-researcher was accountable for conducting, coding, and analyzing two interviews with four students (two students from each grade 3 classroom), as well as two interviews with the teacher-participant. Finally, the teacher-researcher was responsible for coding and analyzing all qualitative data from the experimental and control groups' reflections, as well as her own personal reflections and those completed by the teacher-participant.

Teacher-Participant

This research was designed to examine the impact of an integrated writing program and self-assessment practices on students' writing performance. As such, it was necessary to examine two groups of grade 3 students (an experimental and a control group) in this study. The teacher-researcher's grade 3 teaching partner was, therefore, asked to assist in delivering instruction, conducting assessments, recording reflections, and undergoing audiotaped interviews as a *teacher-participant* for this study. The teacher-participant has been an educator for 28 years. Throughout her career she has taught JK-grade 6, however, she has spent the last 10 years teaching grade 3. The teacher-participant has taught within five different school boards across Ontario. Aside from assuming a role as a classroom teacher, she has also taught ESL (English-as-a-Second-Language) and has worked as a Library Technician. She has taken on the role of Primary Division leader and Teacher-In-Charge (in the administrator's absence) for many years. The teacher-participant sat on a literacy committee to develop mid-term assessment units that would assist in preparing students for the EQAO standardized test. She has an ongoing interest in sound literacy instructional practices, and was, therefore, extremely willing to take part in this study.

One of the teacher-participant's roles in this study was to facilitate genre-specific and trait-based writing lessons in her grade 3 classroom (control group). These lessons were provided to her by the teacher-researcher. She was also responsible for presenting the teacher-created rubrics and reflection prompts to her students for assessment and reflection purposes. Once again, these rubrics and the reflection prompts were provided to her by the teacher-participant. The teacher-participant scored both the experimental

and control groups' pre- and posttest written compositions using the teacher-created rubrics. Finally, the teacher-participant was interviewed twice by the teacher-researcher, and helped to provide additional qualitative to the teacher-researcher by completing personal reflections throughout the course of the school year in which this study took place.

Research Site (Elementary School)

The elementary school in which the teacher-researcher practices was the site for this action research. This elementary school is located in southern Ontario and houses approximately 450 students. The majority of the student population is from a middle-income socioeconomic demographic. There are approximately 35 members on staff, including 2 administrators, 20 teachers, 6 educational assistants, clerical staff, and custodial staff. This school also boasts a highly active parent community, who hold monthly parent council meetings at the school, and are extremely involved in volunteer opportunities inside and outside of the classrooms.

The students at the elementary school research site are predominantly homogeneous in ethnic background with English as a first language. There are a small number of students who speak English as a Second Language and are accommodated for in their respective classrooms. There are a number of students with special needs at this school who receive additional support through the Educational Resource Teacher, Educational Assistants, the Child and Youth Worker, the Speech Pathologist, and additional school board personnel. Children with special needs are placed on an IEP (Individual Education Plan), so that the classroom teacher may make appropriate accommodations or modifications for these children.

The school's most recent grade 3 EQAO scores for the 2009/2010 year, as compared to the school board and provincial scores, are found in Table 1. These percentages indicate the number of students who achieved at or above the provincial standard on the EQAO test. These most recent scores indicate that the school's grade 3 students scored above the provincial average in both reading and writing, but this is not always the case for other Ontario schools and students.

Teacher-Researcher Classroom Description

The teacher-researcher's classroom was located in a portable on the school's tarmac area. There were 18 student desks in the portable, arranged in four groups of four and one group of three. The teacher's desk was at the rear of the classroom. Surrounding the classroom were additional desks on which were placed a variety of book bins containing fiction (e.g., fairy tales, fables, short story compendiums, picture books by sorted by author) and nonfiction texts (e.g., plants, animals, insects, people, places, Canada) that could be accessed by students during various content-area activities, or during independent reading time. At the front of the classroom are shelves that contained basal readers, science and social studies textbooks, and various math manipulatives. Two chalkboards are also located at the front of the class. One chalkboard featured a calendar, a weather posting, and place value baskets (to record each school day into units, tens, and hundreds, therefore, reinforcing this mathematical concept). The second chalkboard was used for morning message activities, lessons/notes, and homework/agenda items. To the right side of the classroom are a third chalkboard and a bulletin board. These two spaces were used as word walls for Language (high frequency words), as well as Science (based

Table 1

Grade 3 EQAO Scores for 2009/2010

Organization	Reading	Writing
Elementary School	98%	96%
School Board	71%	81%
Province of Ontario	62%	70%

on the strand being studied), Mathematics (based on the strand being studied), and Social Studies (based on the strand being studied). There was a large rectangular table next to the teacher's desk that was used for guided reading and writing lessons, as well as *PM Benchmark* (Nelley & Smith, 2001) reading assessments, and writing conferences with individual students. Additional anchor charts, rubrics, and student work were posted on the walls of the room as the school year progressed. Most of the teaching took place on a carpeted area facing the chalkboard/word wall at the side of the room. Students sat on the carpet while the teacher sat in a rocking chair in this area to conduct read-alouds and author studies. A chart stand next to the rocking chair was used to record student responses during specific lessons and activities.

Teacher-Participant Classroom Description

The teacher-participant's classroom was located inside the school, within close proximity of the computer lab and the library. There were 20 student desks in the classroom, arranged in four groups of five. The teacher's desk was in the back, right-hand corner of the classroom, facing the student desks. There was a large rectangular table next to the teacher's desk that was used for guided reading and writing lessons, as well as *PM Benchmark* (Nelley & Smith, 2001) reading assessments, and writing conferences with individual students. At the rear of the classroom are shelves that contained basal readers, science and social studies textbooks, and various math manipulatives. There are also two book shelves in the classroom. One contained teacher resources and manuals. The other contained books on specific fiction (e.g., fairy tales, fables, picture books) and nonfiction (e.g., plants, animals, insects, Canada) topics that could be accessed by students during various content-area activities, or during independent reading time. Two chalkboards are

at the front of the classroom. One chalkboard was used for morning message activities, lessons/notes, and homework/agenda items. The second chalkboard featured Science and Social Studies key terms, based upon specific units of study throughout the school year. To the left side of the classroom are two bulletin boards that were used to post students' work. The rear of the classroom features two additional chalkboards and a third bulletin board. The two chalkboards were used as a word wall focusing on high frequency words (commonly misspelled words). Additional anchor charts, rubrics, and student work were posted on the walls of the room as the school year progressed. Most of the teaching took place on a carpeted area at the front left-hand side of the classroom, facing the two front chalkboards. Students sat on the carpet while the teacher sat in a rocking chair in this area to conduct read-alouds and various lessons. A chart stand next to the rocking chair was used to record student responses during specific lessons and activities.

Student Participants in the Experimental Group

The teacher-researcher had 18 students in her class who were homogeneous in ethnicity and came from middle-income socioeconomic backgrounds. There were nine males and nine females in this class, exhibiting a range of academic achievement (Level 1 to Level 4 overall academic achievement based on the results of the previous year's grade 2 report card). One of the male students has a learning disability, and was on an IEP with accommodations for language- and math-based activities. This child received additional support from an Educational Assistant for one quarter of the instructional day.

Student Participants in the Control Group

The teacher-participant had 20 students in her class who are also homogeneous in ethnicity and come from middle-income socioeconomic backgrounds. There were 10

males and 10 females in this class, exhibiting a range of academic achievement (Level 1 to Level 4 overall academic achievement based on the results of the previous year's grade 2 report card). There were no children with special needs in this classroom, and no additional teacher support was required.

Intervention Study

In some study designs, the researcher may seek to examine the impact of an educational practice or idea on student learning (Creswell, 2008). An *intervention study* is a procedure that can be used “to determine whether an activity or materials make a difference in results for participants” (Creswell, 2008, p. 60). The impact of an intervention study is determined by providing one group/class with a specific set of activities while withholding these activities from another group/class (Creswell, 2008). For the purposes of this study, both the experimental group (teacher-researcher's class) and the control group (teacher-participant's class) received integrated writing instruction (writing traits + writing forms) embedded within the grade 3 science curriculum. However, the experimental group also received additional cross-curricular learning opportunities within the daily literacy block. This entailed exposing students to authentic children's literature and levelled texts with explicit science content during read-alouds, shared reading lessons, guided reading activities, and literacy centres. As well, the students in the experimental group developed their own self-assessment rubrics (the control group used predeveloped rubrics) to use during integrated writing instruction. Table 2 presents an outline of the integrated writing and science instruction that occurred as part of this intervention study. This table includes information on the specific forms and traits of writing that were taught in concert with one another, along with the science

Table 2

Integrated Writing and Science Instruction

WEEKS 1-6	WEEKS 7-12	WEEKS 13-18
Writing Trait	Writing Trait	Writing Trait
IDEAS Focus, clarity, details	ORGANIZATION Introduction, body, conclusion, transitions	SENTENCE FLUENCY Easy to read and follow, different lengths, good transitions from one sentence to another
Writing Form	Writing Form	Writing Form
RECOUNT Personal (direct experience), factual (retell of event that has occurred), or imaginative (relate imaginary events)	REPORT Organize, classify, and record factual information	PERSUASIVE Ideas and details to present a point of view (argument, persuasion, debate)
Science Strand	Science Strand	Science Strand
UNDERSTANDING LIFE SYSTEMS Growth and Changes in Plants *Read-Aloud *Shared Reading *Guided Reading *Literacy Centres	UNDERSTANDING LIFE SYSTEMS Growth and Changes in Plants *Read-Aloud *Shared Reading *Guided Reading *Literacy Centres	UNDERSTANDING EARTH AND SPACE SYSTEMS Soils in the Environment *Read-Aloud *Shared Reading *Guided Reading *Literacy Centres
WEEKS 19-24	WEEKS 25-30	
Writing Trait	Writing Trait	
VOICE Individuality, enthusiasm (for topic), confidence (knowledge of topic), interest	WORD CHOICE Verbs, nouns, adjectives, prepositions, fits the topic	
Writing Form	Writing Form	
NARRATIVE Imagination, entertainment, fairy tale, fable, fictional story	PROCEDURE Way to do things, ordered sequence (recipes, science experiments, rules)	
Science Strand	Science Strand	
UNDERSTANDING MATTER AND ENERGY Forces Causing Movement *Read-Aloud *Shared Reading *Guided Reading *Literacy Centres	UNDERSTANDING STRUCTURES AND MECHANISMS Strong and Stable Structures *Read-Aloud *Shared Reading *Guided Reading *Literacy Centres	

Note. Only the experimental group received the instructional treatment denoted

*by the **

strands that were linked to each of these trait-based, genre-specific connections. Since there were five traits and five forms of writing being examined in this study, yet there are only four specific science strands within the Ontario science curriculum (Ministry of Education of Ontario, 2007), it should be noted that one of the science strands (Understanding Life Systems—Growth and Changes in Plants) was merged into writing instruction at two different points.

Instrumentation

In this mixed-methods study, multiple quantitative and qualitative tools were used to collect data: baseline data on students' reading fluency (see Appendix A for a sample of a levelled text and scoring guide) and comprehension levels (see Appendix B for the comprehension rubric) from the *PM Benchmark Kit* (Nelley & Smith, 2001); diagnostic (pretest) and summative (posttest) science assessments; teacher-created and student-developed writing rubrics (see Appendices C and D); student and teacher interview protocols (see Appendices E and F); and student and teacher reflection prompts (see Appendices G and H). These various forms of data collection helped to establish the credibility of the findings of this study (Wiersma & Jurs, 2005).

Quantitative Measures

The following section outlines the measures that were used to provide quantitative data for this study. These measures include reading fluency and comprehension assessments, science assessments, and writing assessments featuring teacher-created and student-generated rubrics.

Reading Fluency and Comprehension Assessments

Baseline information on students' reading levels (fluency and comprehension)

was obtained for both classes. Students in the teacher-researcher's class received additional exposure to content-area science texts during the daily literacy block. Much of the literacy block involved reading and understanding content and vocabulary specific to science. It was, therefore, necessary to have information on students' reading abilities in order to match text choices to their abilities. Students' reading fluency rates were determined using levelled readers and scoring guides included within the *PM Benchmark Kit* (Nelley & Smith, 2001). Students' reading comprehension levels were determined using the comprehension rubric included in Appendix B.

To identify students' overall reading levels, each child's instructional fluency rate (the rate at which students can comfortably read a text without becoming frustrated) was determined. Some students showed instructional fluency at several levels (i.e., a child who is instructionally fluent at a Level 22 text may also show instructional fluency at Levels 23 and 24, and will not reach the "frustration" stage until reading the Level 25 text). In this case, the child's fluency rate was determined with reference to the *highest* level of instructional fluency. The comprehension level associated with the child's instructional fluency rate was then ascertained and recorded using the comprehension rubric. Data on students' reading scores were collected in October/2008, at the beginning of the school year, and again in June/2009, near the conclusion of the instructional year.

Science Assessments

Diagnostic (pretest) science assessments were conducted prior to the introduction of each new science strand (i.e., Understanding Life Systems—Growth and Changes in Plants; Understanding Matter and Energy—Forces Causing Movement; Understanding Earth and Space Systems—Soils in the Environment; and Understanding Structures and

Mechanisms—Strong and Stable Structures; (Ministry of Education of Ontario, 2007) as prior knowledge of science concepts and content-area vocabulary can impact the traits of ideas and word choice in students' writing. Summative (posttest) assessments were conducted at the completion of each science strand in order to record students' growth in content-area knowledge and vocabulary, potentially impacting on the quality of students' writing. Each pre- and post-assessment consisted of approximately 20 questions. These questions fell under the categories of *multiple-choice questions*, *fill-in-the-blanks*, *matching* (of key terms and their associated definitions), and *short answer questions*. These assessments determined students' existing knowledge of key terms related to each science strand, as well as their understanding of specific science-related concepts.

Writing Rubrics

Student-friendly integrated writing rubrics (see Appendix C) were created by the teacher-researcher for students in the teacher-participant's class to utilize in the self-assessment of their writing. These rubrics were also used by the teacher-researcher and the teacher-participant to score students' pre- and posttest written pieces. This series of five integrated rubrics was designed, combining both genre-focused and trait-based criteria and descriptors, into clear and specific assessments of student writing (recount + ideas; report + organization; persuasive + sentence fluency; narrative + voice; procedure + word choice). Embedded within these rubrics is terminology from the Ministry of Education of Ontario's (2006) revised language document. The students in the teacher-researcher's class developed self-assessment rubrics collaboratively with the teacher-researcher (see Appendix D), rather than being provided with a series of predeveloped rubrics.

Qualitative Measures

The following section outlines the measures that were used to provide qualitative data for this study. These measures include student interviews, interviews with the teacher-participant, student reflections, and teacher reflections.

Student and Teacher Interviews

Student interviews were conducted by the teacher-researcher with two students from each of the two participating grade 3 classes. These students were purposefully selected by the teacher-researcher and the teacher-participant based on their academic levels of achievement. All four students fell into the Level 3 range of academic success, and as such, were selected in order to obtain consistent information and results from the student interviews. In order to ensure an equitable representation of gender, one male and one female student from each of the two classes were selected for the interviews. These students were assigned pseudonyms for the purposes of confidentiality. The male and female students in the experimental group were given the pseudonyms *Donald* and *Diana*, while the male and female students in the control group were given the pseudonyms *Alex* and *Andrea*. These same four students were interviewed at two points during the school year (January/2009 and June/2009). Each interview took place in the school's book room, was audiotaped, and lasted approximately 20 minutes. The teacher-participant was also interviewed by the teacher-researcher twice, at the same time of year that the student interviews were conducted. The interviews with the teacher-participant also took place in the school's book room, were audiotaped, and lasted approximately 30-45 minutes.

Student and Teacher Reflections

Student reflections were collected based on their experiences during writing lessons, as well as their views of self-assessment and the writing process. Students were provided with specific prompts to help guide them in making their reflections (see Appendix G). The students engaged in the reflection process after completing the published (final) copies of each of their five written compositions. As each student completed five reflections, and there were a total of 38 students (18 from the teacher-researcher's class and 20 from the teacher-participant's class) who were involved in this study, 190 reflections were collected for coding and data analysis. Teacher reflections were also recorded by both the teacher-researcher and the teacher-participant surrounding the writing instruction and assessment practices of this study. The teacher-researcher's reflections occurred after each of the writing lessons. Both the teacher-researcher and the teacher-participant recorded reflections at the conclusion of each of the five integrated units, and following each of the marking sessions in which students' written work was scored.

Instrument Validation

The following section of this chapter outlines the procedures that were followed to insure that valid instruments were used for data collection throughout this study.

Reading Fluency and Comprehension Assessments

Baseline information on students' reading levels (fluency and comprehension) was determined using a comprehensive reading assessment tool entitled *PM Benchmark Kit* (Nelley & Smith, 2001). The teacher-researcher has extensive knowledge of this tool, having used this program as a primary and junior classroom teacher, as well as a Literacy

Coach. The teacher-researcher has employed this program to assess the reading levels of students in JK to grade 3, and has also worked with older learning-disabled students in grades 4-8 using the *PM Benchmark Kit* (Nelley & Smith, 2001). The teacher-participant also possesses extensive knowledge of the *PM Benchmark Kit* (Nelley & Smith, 2001). She has used this assessment tool since its development, with students in grades 2 and 3. The teacher-participant has also trained primary teachers on appropriate reading assessment administration using the *PM Benchmark Kit* (Nelley & Smith, 2001).

Science Assessments

It is common practice for classroom teachers to develop diagnostic, formative, and summative assessments in the form of tests and quizzes. As such, the teacher-researcher has had an array of experiences in developing effective assessment tools within various content areas at a range of grade levels. The teacher-researcher has also presented as a guest lecturer at Brock University in the area of assessment and evaluation. Finally, the teacher-researcher was a co-author of *An Assessment Bank for Classroom Assessment: Concepts and Applications – First Canadian Edition*. (Gallagher, Engemann, & Morawek, 2007). The pre- and post-assessments for each science strand were developed collaboratively by both the teacher-researcher and the teacher-participant, in order to validate these assessment tools.

Writing Rubrics

The teacher-created integrated rubrics that were used by students to self-assess their writing were developed collaboratively by the teacher-researcher and a university professor. These rubrics were then field-tested during the 2006/2007 school year within two grade 2 classes: that of the teacher-researcher, and that of a colleague within the

same school. Revisions were made to the rubrics based on professional observations of the two teachers and the university professor. Student comments and reflections were also employed to make any necessary modifications to these rubrics.

Student and Teacher Interviews

The teacher-researcher had the opportunity to participate in an action research project for the Ontario Ministry of Education on the topic of boys' literacy. As part of this former project, it was necessary that 21 students undergo audiotaped interviews, which were each approximately 20 minutes in length. Therefore, the teacher-researcher had former experience conducting, coding, and analyzing interviews with primary students before undertaking this study. Prior to the student interviews that took place in this current research study, the teacher-participant was asked to review the interview questions as part of the validation process (see Appendix E). After the student interviews were conducted, the teacher-participant was asked to validate the students' responses.

The teacher-researcher had interviewed a former administrator as part of one of her graduate courses on teaching effectiveness. The teacher-researcher was, therefore, familiar with the process of interviewing one's peers prior to beginning this research study. The interview protocol (see Appendix F) was validated by both a primary-grade teacher and a university professor. The teacher-participant was interviewed twice (January/2009 and June/2009) and was provided with the transcripts following the interviews, in order to member check the information that she provided.

Student and Teacher Reflections

The teacher-researcher had conducted reflections with grades 2 and 3 students in the past, as part of her own instructional practice and inquiry. The teacher-researcher had

refined the student reflection prompts she used in the past, and collaborated with the teacher-participant to develop age-appropriate, content-specific reflection prompts for this study (see Appendix G). Teacher reflection prompts were also developed by the teacher-researcher (see Appendix H) and validated by the teacher-participant.

Field Procedures

The following section of this chapter outlines the specific field procedures that were followed to collect both quantitative and qualitative data throughout this study.

Reading Fluency and Comprehension Assessments

At the beginning of this study (October/2008), the teacher-researcher and the teacher-participant conducted reading assessments using the *PM Benchmark Kit* (Nelley & Smith, 2001) with the grade 3 students in their respective classrooms (18 students in the teacher-researcher's class and 20 students in the teacher-participant's class). This was done to establish students' baseline reading fluency and comprehension levels and to examine similarities and differences among the reading levels of students in the two grade 3 classes. The *PM Benchmark Kit* (Nelley & Smith, 2001) reading assessments were administered a second time at the end of this study (June/2009) to again examine students' similarities and differences in terms of reading ability.

Science Instruction and Assessment

A series of four science units based on the grade 3 science curriculum were taught over the course of this study (Understanding Life Systems—Growth and Changes in Plants; Understanding Earth and Space Systems—Soils in the Environment; Understanding Matter and Energy—Forces Causing Movement; and Understanding Structures and Mechanisms—Strong and Stable Structures; (Ministry of Education of

Ontario, 2007). The teacher-researcher and the teacher-participant followed identical outlines and timelines in delivering science instruction (i.e., lessons, activity sheets, experiments, field trips). Science lessons for both the experimental and control groups typically featured the reading of a text based on a specific science concept, followed by a related worksheet, activity, or experiment that students completed either independently or in small groups. Explicit writing lessons linking science content to specific writing forms and traits was also delivered by both teachers in their respective classrooms; however, the teacher-researcher provided the teacher-participant with lesson plans and writing exemplars in order for both teachers to deliver identical writing instruction to both groups of grade 3 students. Writing lessons for each integrated writing unit occurred twice/week for a 3-week period. Students were then given 2 weeks in which to complete a written composition based on the integrated writing and science lessons.

In order to establish students' prior knowledge of science vocabulary and content, both classes of students were given a short assessment at the beginning of each new science unit (pretest science assessment). These assessments were developed by the teacher-researcher in collaboration with the teacher-participant. Students completed the assessments in their respective classrooms and the two teachers marked the assessments collaboratively during their daily prep and planning period (the teacher-researcher and teacher-participant shared this period and could, therefore, work collaboratively on these tasks at the school). Assessments were also administered as summative tools at the conclusion of each science unit (posttest science assessment). These assessments were necessary so that once again similarities and differences could be examined with respect to the overall science achievement levels of the students in each grade 3 class.

Writing Instruction

One of the goals of this study was to determine whether an integrated approach to writing instruction can enhance the quality and depth of students' written compositions. In an earlier study, the teacher-researcher collaborated with a university professor to design and apply writing instruction and assessment tools that combined genre-focused writing instruction with trait-based instruction. Through problem solving and experimentation, the following forms and traits of writing were found to link well with each other for instructional and assessment purposes: recount + ideas; report + organization; persuasive + sentence fluency; narrative + voice; and procedure + word choice.

For this current study, the teacher-researcher employed these unified forms and traits to deliver integrated writing units embedded within the grade 3 science curriculum. There were a total of five integrated units, each lasting 5 weeks. Prior to each writing unit, students in both the experimental and control groups were asked to complete a pretest writing composition on a general topic, with a focus on the form and trait that would be subsequently studied. Table 3 presents a list of pretest topics on which students were asked to write.

Once students had completed the written pretest, each 5-week unit commenced with three writing trait lessons. The teachers then conducted three form/genre-specific lessons, while continuing to reference the trait of writing that was also being studied. The initial lesson on the writing trait, as well as the introductory lesson on the form of writing to be studied, were conducted by the teacher-researcher for both the experimental and control groups. The remaining writing lessons were conducted by the teacher-researcher

Table 3

Pretest Writing Topics

Writing Form	Writing Trait	Pretest Writing Topic
Recount	Ideas	Write a recount about the musical performance that we attended in the school's gym yesterday.
Report	Organization	Write a report on an animal of your choice.
Persuasive	Sentence Fluency	Write a persuasive piece telling a reader whether or not you feel recess is an important part of the school day for students.
Narrative	Voice	Write a narrative story on a topic of your choice.
Procedure	Word Choice	Write a procedure telling a reader how to make an ice cream sundae.

and the teacher-participant in their respective classrooms. However, all remaining writing lessons were developed by the teacher-researcher and given to the teacher-participant to be used in her classroom. The final 2 weeks of the unit saw the students engaged in the writing process to create a posttest written composition that was directly related to the science strand being studied while possessing characteristics of both the specific form and trait of writing being examined. Table 4 outlines the posttest topics on which students were asked to write.

Writing Assessment

For each of the five integrated units, students initially produced a pretest written composition on a general topic. At the end of each unit, students were asked to produce a posttest composition that was science-specific, and included features of the form and trait of writing that were studied. Students were given 1 week to create a rough draft of their posttest compositions, and were then asked to self-assess this draft using either a student-generated rubric, that was developed collaboratively with the teacher-researcher (experimental group), or a rubric created solely by the teacher-researcher (control group). Teacher-created rubrics provided to the control group for self-assessment purposes were discussed ahead of time with the teacher-participant, so that she could confidently address her students' questions regarding these rubrics or clarify vocabulary challenges within a given rubric. Students in the experimental group were not given a predeveloped rubric, but generated a rubric in collaboration with the teacher-researcher, based on the instruction they had received on the given trait and form of writing of a particular integrated unit.

Students were asked to use their rubrics (after self-assessing their rough drafts) to

Table 4

Posttest Writing Topics

Writing Form	Writing Trait	Science Strand	Writing Topic
Recount	Ideas	Growth and Changes in Plants	Write a recount about the nature walk we took, during which we collected and studied different types of plant life.
Report	Organization	Growth and Changes in Plants	Write a report on the parts of a plant, using information we have gathered on plants' seeds, roots, stems, leaves, and flowers.
Persuasive	Sentence Fluency	Soils in the Environment	Write a persuasive piece telling a reader whether or not you think it is a good idea to adopt a composting program at home and at school.
Narrative	Voice	Forces Causing Movement	<p>Write a narrative on one of the following three topics:</p> <p>a) The Earth has lost its gravitational force and everything begins to float above the Earth's surface. Write a narrative using this idea as the <i>problem</i> to your story.</p> <p>b) Everything the main character touches gives him/her an electric shock. Write a narrative using this idea as the <i>problem</i> to your story.</p> <p>c) A giant magnet has been sent from another planet to collect everything on Earth that is made of metal. Write a narrative using this idea as the <i>problem</i> to your story.</p>
Procedure	Word Choice	Strong and Stable Structures	Create a strong and stable structure using materials from home and school. Then, write a procedure telling a reader how to build this structure.

revise and edit their writing, in order to produce higher-level compositions. Once students completed a final, published copy of their writing, they also assessed this final piece using a clean copy of the same rubric. This second assessment was completed in order to determine whether students had demonstrated growth from their rough drafts to the final products of their written compositions. The teacher-researcher and teacher-participant then collected students' rough work and initial self-assessments, along with their final compositions and corresponding rubrics.

Reflections

Students were provided with reflection prompts following each of the 5-week integrated units. These prompts were handed out to students in their respective classrooms, and students were given as much time as they needed to complete the reflections. These were collected by the teacher-researcher for open-coding and qualitative analysis.

The teacher-participant and teacher-researcher also completed reflections using a series of key words to serve as prompts. These reflections were recorded following each of the integrated writing lessons (six lessons/unit). Both the teacher-researcher and the teacher-participant also recorded reflections at the conclusion of each of the five integrated units. These reflections were gathered by the teacher-researcher for open-coding and qualitative analysis.

Interviews

Student interviews were conducted by the teacher-researcher with two students from each of the two grade 3 classes. These students were purposefully selected by the teacher-researcher and the teacher-participant based on their levels of academic

achievement (all students achieved at a Level 3 in the areas of literacy and science) and gender representation (one male and one female from each classroom were selected). The same four students were interviewed twice during the school year (January/2009 and June/2009). The teacher-participant was interviewed by the teacher-researcher at two points during the school year, on the same dates that the student interviews were conducted. All interviews were audiotaped and transcribed by the teacher-researcher. The teacher-researcher then engaged in open-coding and qualitative analysis of these interviews.

Summary of Field Procedures

Table 5 provides a sample of a 5-week integrated unit indicating aspects of both the intervention study and data collection. This table includes information on the number of genre-specific and trait-based lessons that occurred over one 5-week period (the length of each integrated unit). Included are the days on which diagnostic and summative science assessments, writing pre- and posttests, student self-assessments, teacher reflections, and student reflections took place.

Data Analyses

As a mixed methods study, both qualitative and quantitative forms of data required separate and distinct analyses procedures.

Reading Fluency and Comprehension Assessment

Data derived from students' reading levels using the *PM Benchmark Kit* (Nelley & Smith, 2001) were used to show whether the two grade 3 classes were academically comparable in the areas of reading fluency and comprehension. The students' fluency

Table 5

Sample 5-Week Unit: Instruction, Assessment, and Data Collection At-A-Glance

	Mon.	Tues.	Wed.	Thurs.	Fri.
Week 1	<ul style="list-style-type: none"> Diagnostic (pretest) <i>science assessment</i> <i>Writing pretest</i> 	<ul style="list-style-type: none"> writing <i>trait</i> lesson* <i>teacher reflections</i> 		<ul style="list-style-type: none"> writing <i>trait</i> lesson* <i>teacher reflections</i> 	
Week 2		<ul style="list-style-type: none"> writing <i>trait</i> lesson* <i>teacher reflections</i> 		<ul style="list-style-type: none"> writing <i>form</i> lesson* <i>teacher reflections</i> 	
Week 3		<ul style="list-style-type: none"> writing <i>form</i> lesson* <i>teacher reflections</i> 		<ul style="list-style-type: none"> writing <i>form</i> lesson* <i>teacher reflections</i> 	<ul style="list-style-type: none"> <i>development of rubric with teacher-researcher's class</i>
Week 4	<ul style="list-style-type: none"> discussion of <i>rubrics</i> and assignment of integrated <i>writing task</i> 			<ul style="list-style-type: none"> <i>rough draft</i> of integrated writing piece due 	<ul style="list-style-type: none"> <i>student self-assessment</i> of rough draft
Week 5				<ul style="list-style-type: none"> <i>published copy</i> of integrated writing piece due 	<ul style="list-style-type: none"> <i>student self-assessment</i> of published piece and <i>student reflection</i> on integrated writing unit summative (posttest) <i>science assessment</i>

Note. Science content was embedded into each of the specific writing form and trait

lessons as denoted by the asterisk.

rates were determined using levelled books included within the *PM Benchmark Kit* (Nelley & Smith, 2001). A running record was taken while a given student read a specific levelled text, and the student's fluency rate was then determined by measuring the number of reading errors against the number of words in the text (e.g., 8 errors / 200 words = 0.04 = 96 % fluency rate). A student's comprehension level was determined using a rubric featuring six criteria, each with a maximum score of four. The rubric was, therefore, totalled out of 24, and a student's overall average was then determined based on this score. Students' comprehension scores were based on the levelled text that they were able to read with the greatest fluency. These reading assessments were conducted at the beginning (October/2008) and at the conclusion (June/2009) of the study. Scores from the two classes were compared using independent samples *t*-tests (Glass & Hopkins, 1996).

Science Assessments

The scores obtained from students' diagnostic (pretest) science assessments were measured against their summative (posttest) scores for each of the four strands of science that were taught over the course of the school year using independent samples *t*-tests (Glass & Hopkins, 1996). Four independent samples *t*-tests were conducted, based on each of the four science strands that were integrated within writing instruction. The results of these pre- and postscience assessments were used to draw comparisons of the science vocabulary and content knowledge between the two grade 3 classes.

Writing Rubrics

The first of several research questions to be examined in this study was to

determine whether an integrated approach to writing instruction would assist grade 3 students in effectively applying five specific traits of writing (ideas, organization, sentence fluency, voice, and word choice) in compositions of different forms (recount, report, persuasive, narrative, procedure). To answer this question, data from the self-assessments conducted by students in the experimental group were compared at two points (after the completion of the rough drafts and final, published pieces of their writing compositions) for each of the five specific integrated writing units. Students in the experimental group used the student-generated writing rubrics for the self-assessments of their writing. Paired samples *t*-tests (Glass & Hopkins, 1996) were used to determine students' levels of growth in writing from the drafting stage to the publishing (good copy) stage of the writing process.

Assessment data were also conducted by the teacher-researcher using the student-generated writing rubrics, in order to compare the rough drafts of the experimental students' writing with the final, published copies of these students' compositions. Once again, paired samples *t*-tests (Glass & Hopkins, 1996) were conducted to establish students' levels of growth in applying the forms and traits of writing in an integrated manner.

Students in the control group were also given opportunities to self-assess their writing following the completion of each integrated unit. However, these students utilized the teacher-created versions of the writing rubrics for their self-assessments. As with the experimental group, students in the control group evaluated the rough copies and final published copies of their written work. Paired samples *t*-tests (Glass & Hopkins, 1996) were also used with the control group to determine growth in students' writing.

In order to further establish whether students were successful in producing pieces of writing that effectively integrate specific forms and traits of writing, the teacher-researcher and the teacher-participant scored students' pre- and posttest writing assignments for each of the five integrated writing units, using the teacher-created assessment rubrics. Data from students' pre- and posttest written pieces for both the experimental and control groups were collected using paired samples *t*-tests (Glass & Hopkins, 1996) in order to ascertain whether there was growth in students' writing.

In order to confirm that interrater reliability existed between the teacher-researcher and the teacher-participant throughout this study, a Pearson product-moment correlation coefficient *r* (Glass & Hopkins, 1996) was conducted. Assessing students' writing compositions requires a degree of evaluative judgment (Aiken, 2000). Thus, it is important to ensure that different graders agree on the assigned values of students' written compositions, including the various form- and trait-based aspects of these pieces of writing. The process of determining interrater reliability is such that graders assess writing compositions, and the correlation or intraclass coefficient between the graders' scores is then calculated (Aiken, 2000). For the purposes of this study, the Pearson product-moment correlation coefficient *r* (Glass & Hopkins, 1996) was used to determine the degree of rating reliability between the teacher-researcher and teacher-participant on all students' pre- and posttest writing samples.

The focus of the second research question posed for this study was whether a difference existed between the writing compositions of grade 3 students who received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media

literacy) and the writing compositions of grade 3 students who simply received nonintegrated language arts instruction. Both the teacher-researcher and the teacher-participant used the teacher-created versions of the rubrics to assess students' posttests from all five integrated units. Independent samples *t*-tests (Glass & Hopkins, 1996) were then conducted in order to determine whether differences existed between the posttests of the control and experimental groups.

The third research question addressed whether grade 3 students could reliably self-assess their written compositions using student-generated rubrics. In order to determine students' abilities to self-assess their writing using student-generated rubrics, a Pearson product-moment correlation coefficient *r* (Glass & Hopkins, 1996) was conducted comparing the experimental students' self-assessments of their writing against the teacher-researcher's scores of these students' written work. Correlations were conducted for both the rough drafts of students' five written pieces, as well as for the final, good copies of students' five writing assignments.

The fourth research question addressed whether grade 3 students could reliably self-assess their written compositions using teacher-created rubrics. Students in the control group completed rough drafts and good copies for each of the five writing units. The good copies (posttests) of these written pieces were scored by the control students themselves, the teacher-researcher, and the teacher-participant, using the teacher-created versions of the writing rubrics. A Pearson product-moment correlation coefficient *r* (Glass & Hopkins, 1996) was conducted comparing the teacher-researcher's scores to the students' assessments of their posttest (good copies) writing, as well as the teacher-participant's scores to the students' posttest writing self-assessments.

Interviews and Reflections

The eight student interviews (four students at two points during the study) and two teacher interviews (teacher-participant at two points during the study) were transcribed, coded, and analyzed by the teacher-researcher. Initially, the transcribed interviews were read by the teacher-researcher to determine common themes, using an *open coding* process (Creswell, 2008). During this process “the data are separated into discrete parts, closely examined, and compared for similarities and differences” (Mertens, 1998, p. 352). When coding interview data, it is typical for researchers to identify between five and seven common themes (Creswell, 2008). These themes represent the key reoccurring categories articulated in the participants’ responses. Once the themes were identified, they were reexamined to determine their connectedness. This was accomplished using *axial coding*. “Axial coding is the phase of the analytic process in which the researcher puts the parts of the data identified and separated in open codes back together to make connections between categories” (Mertens, 1998, p. 352). The same coding process was used to analyze the data pertaining to the student reflections (conducted at the conclusion of each of the five integrated units), as well as the teacher reflections (conducted by the teachers after each writing lesson, and following each opportunity to mark students’ writing samples). The teacher reflections will be used to corroborate patterns found in the teacher-participant’s interviews.

The four students who were interviewed for this study were assigned pseudonyms in order to protect their identities throughout this research process. The male and the female students in the experimental group were given the pseudonyms *Donald* and *Diana*, while the male and female students in the control group were assigned the

pseudonyms *Alex* and *Andrea*. The teacher-participant was not assigned a pseudonym, as she is being referred to as the *teacher-participant* throughout this study. All interview transcriptions are being retained with these identifying pseudonyms. The final presentation of the findings employs pseudonyms for anyone connected to and/or mentioned within this study.

Figure 1 presents a summary of the various data sources used to address this study's six research questions. Figure 2 then provides a more detailed outline of the data collection and analysis that occurred within this study.

Limitations

Limitations are conditions outside of the researcher's control that may affect data collection and analysis (Mertler & Charles, 2005). It is naturally difficult to avoid limitations or restrictions when conducting research. However, every effort was made to ensure a high level of ethical and professional quality during this study, in order to minimize any limitations to this research. First, the age/grade level of the students selected for this study may have impacted on the writing self-assessments and student reflections. This research was conducted within two grade 3 classrooms, where the average age of the students was 8 years old. Vygotsky describes 8-year-old children as learners and developers of theoretical approaches to problem solving in a world of material things, who possess the beginnings of reflective thinking and mental schema development (as cited in Coyle, Russell, Shields, & Tanaka, 2007). Some students might, therefore, have struggled with the concepts of self-assessment and reflection. These practices require higher-level, critical thinking skills, as well as the development of metacognition skills.

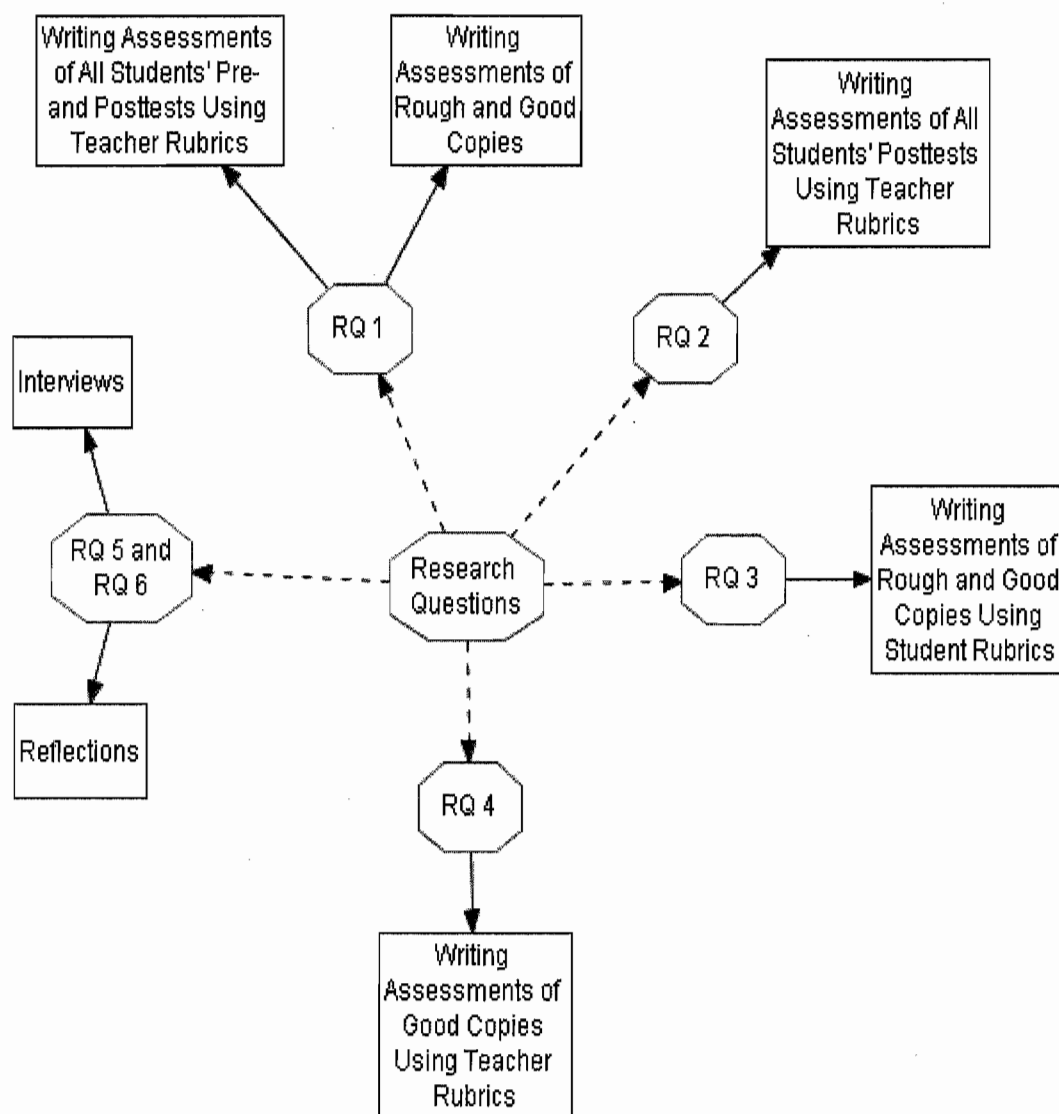


Figure 1. The relationship between study research questions and data sources.

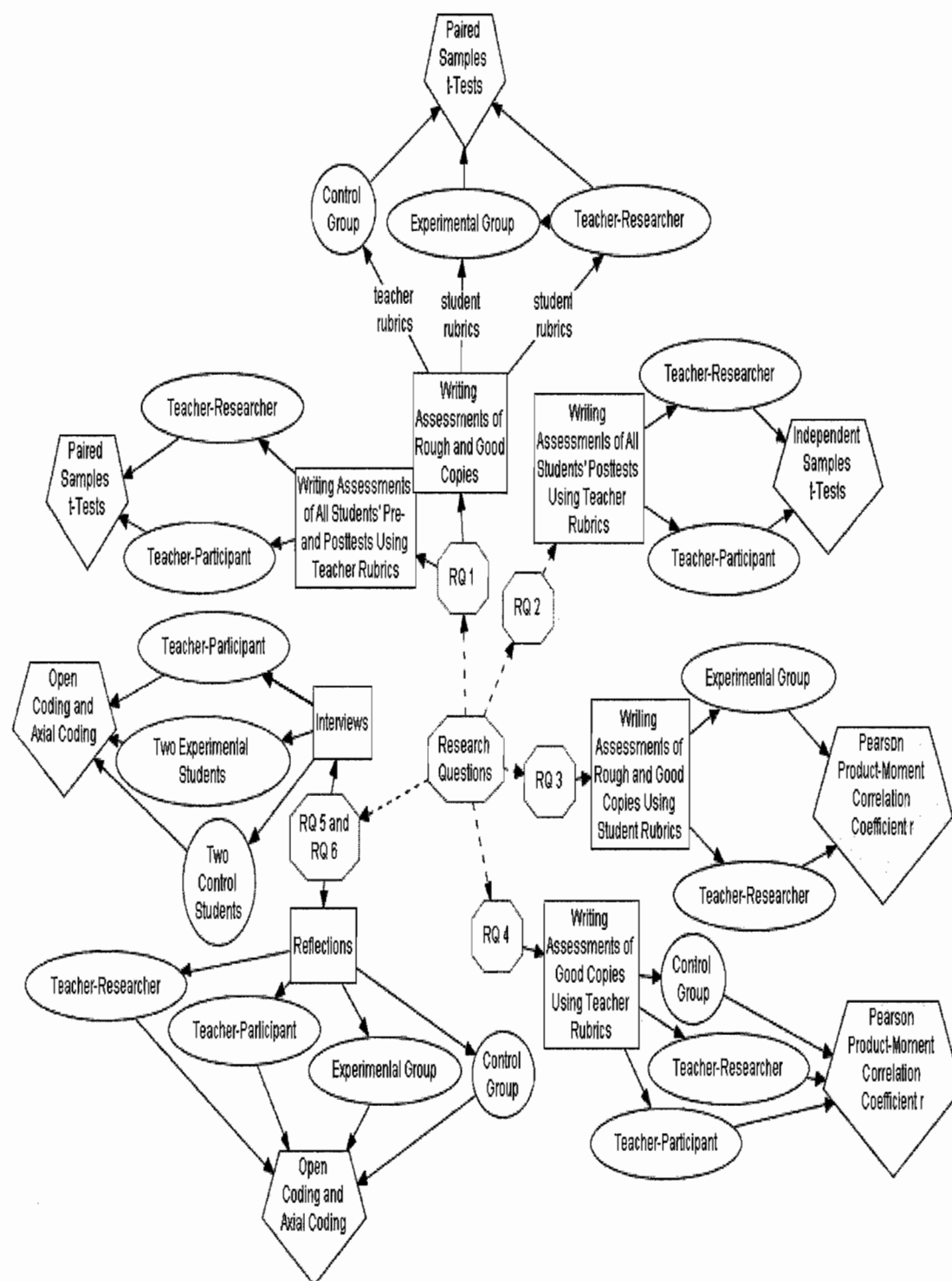


Figure 2. The relationship between study research questions and data analysis measures.

Students' reading levels may have hindered their abilities to comprehend content-area vocabulary during specific integrated science and literacy reading tasks. Students with reading levels that fell below the grade 3 standard may have found it difficult to comprehend the language embedded within the rubrics, as well as the reflection prompts provided within this study. Every effort was made to ensure that the language within the rubrics was age-appropriate, and that all reading material met an appropriate reading-level for grade 3 students.

Member checking might have been a third limitation to this study, as the students involved in the interview process were under the age of 10. Children this age typically have shorter attention spans and become distracted more easily than older children (Coyle et al., 2007). Since children have a tendency towards compliance, and are open to suggestibility, Coyle et al. (2007) suggest that the interviewer use open-ended questions and allow considerable wait time for responses, in order to minimize limitations to the interview process and this overall source of qualitative data.

Maturation was also a limitation to this research in that the students involved in the study may have developed socially and academically throughout the school year, potentially demonstrating a marked improvement in their reading, writing, and science achievement. Selection of participants at the same grade level (i.e., grade 3) helped to control for this potential limitation (Creswell, 2008).

Teacher bias was considered as a potential limitation to this study, since both the teacher-researcher and the teacher-participant scored the written compositions of their students, initiating possible preconceptions regarding students' writing abilities. Although students' names were not present on any writing samples (as these samples were

numbered), the teacher-researcher was still cognizant of the differentiation between the experimental and control students' written work. Nevertheless, the teacher-researcher and the teacher-participant made every effort to avoid bias and to remain neutral parties when scoring students' writing.

Finally, there was a lack of treatment fidelity in this study, as it was the responsibility of the teacher-researcher to monitor the accuracy of the instruction and assessment practices occurring in both the experimental and control groups. Although the teacher-researcher provided lesson plans to the teacher-participant on the writing instruction to be presented to students, it was difficult for the teacher-researcher to monitor whether the teacher-participant implemented these lessons exactly as outlined. Therefore, the two groups of grade 3 participants may not have received precisely the same writing instruction.

Establishing Credibility

Credibility was established throughout this study by way of three specific techniques. First of all, due to the mixed methods nature of this research, multiple data collection tools were used. As previously stated, both qualitative and quantitative forms of data were gathered throughout this research. For the quantitative data, students' scores based on self-assessments of their writing were collected, along with the teacher-researcher's and teacher-participant's scores assigned to students' written pieces. Students' baseline reading levels in both classes were collected as a form of quantitative data. Students' diagnostic (pretest) and summative (posttest) assessments from each science strand were gathered. Qualitative data collection measures included student and teacher interviews, and student and teacher reflections.

Triangulation of data collection procedures is a second technique that was used to establish credibility throughout this study. In essence, triangulation is a cross-validation of qualitative data. "It assesses the sufficiency of the data according to the convergence of multiple data sources of multiple data collection procedures" (Wiersma & Jurs, 2005, p. 256). The two forms of qualitative data collected during this study (i.e., interviews and reflections) were compared in order to corroborate these findings and establish credibility of this research. Member checking was also applied to establish further credibility to the teacher-participant's interviews and reflections. Instrument validation (e.g., prior use of rubrics and reflections with students; previous experience in conducting interviews with children and adults) helped to establish credibility to this study.

Ethical Considerations

Brock University's Research Ethics Board requirements hold that before any research with human participants can be initiated, the Research Ethics Board must provide ethical clearance for the researcher's study to take place. Educational research must be approved by the school board within which the study is taking place before the researcher can commence data collection procedures. Ethical approval to conduct this research was received from Brock University's Research Ethics Board (File Number 08-072) in October/2008 (see Appendix I). Ethical clearance from the School Board Ethics Committee was also granted in October/2008. At the completion of the study, a letter of appreciation was sent to the parents of all student participants, as well as to the teacher-participant taking part in this study.

Restatement of the Area of Study

An abundance of rules and processes exist that children must acquire in order to

become successful writers. Effective writing instruction and assessment can assist students in developing the necessary skills to write well. There are currently numerous viable approaches to writing instruction available for educators to utilize in their classrooms, yet students continue to struggle to meet provincial standards in the area of writing. The purpose of this study, then, was to examine the effectiveness of an integrated approach to writing instruction, as well as the efficacy of adopting student self-assessment strategies, on the writing achievement of grade 3 students. This mixed-methods inquiry was conducted to answer the following research questions:

1. Does an integrated approach to writing instruction assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, word choice) of writing within science-based written compositions?
2. Is there a difference between the writing compositions of grade 3 students who have received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy) and the writing compositions of grade 3 students who have not received the science integration component throughout language arts instruction?
3. Can grade 3 students reliably self-assess their written compositions with student-generated rubrics?
4. Can grade 3 students reliably self-assess their written compositions with predeveloped rubrics provided by the classroom teacher?

5. How aware are grade 3 students of the forms and traits of writing after receiving an integrated approach to writing instruction?
6. How can grade 3 writers' self-assessments and reflections be used to guide teachers in their instructional decision making?

The data for this study were gathered through (a) reading assessments, (b) science assessments, (c) student and teacher writing assessments (d) student and teacher interviews, and (e) student and teacher reflections. The findings that emerged from this study are presented in the subsequent chapter.

CHAPTER FOUR: PRESENTATION OF RESULTS

The acquisition of writing competence is one of the most necessary skills that children must develop in order for them to effectively communicate in a world bursting with innumerable forms of literacy. Thus, the purpose of this research was to examine the effect of an integrated approach to writing instruction and assessment on grade 3 students' writing development and achievement. All writing instruction featured lessons on specific forms and traits of writing, and was embedded within the four strands of the grade 3 Ontario science curriculum. This mixed-methods, quasi-experimental study was guided by the following research questions:

1. Does an integrated approach to writing instruction assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, and word choice) of writing within science-based written compositions?
2. Is there a difference between the writing compositions of grade 3 students who have received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy) and the writing compositions of grade 3 students who have not received the science integration component throughout language arts instruction?
3. Can grade 3 students reliably self-assess their written compositions with student-generated rubrics?
4. Can grade 3 students reliably self-assess their written compositions with predeveloped rubrics provided by the classroom teacher?

5. How aware are grade 3 students of the forms and traits of writing after receiving an integrated approach to writing instruction?
6. How can the self-assessments and reflections of grade 3 writers be used to guide teachers in their instructional decision making?

The students in two grade 3 classrooms participated in this study after being granted parental consent. Both quantitative and qualitative data were collected from these students based on self-assessments of their written work, personal reflections, and interview data from four specific students.

All students had the opportunity to engage in the writing process on five specific occasions from October/2008 to June/2009, and self-assessed their own writing using assessment tools (rubrics) that were designed with both the forms and traits of writing in mind. Data were collected from students in both an experimental group (teacher-researcher's class) and a control group (teacher-participant's class). Students in the experimental group were asked to assess their writing using rubrics which they had collaboratively created alongside the teacher-researcher. Quantitative data were also collected from students in the control group, who were asked to assess their written work using predeveloped, teacher-created rubrics. As the content within each rubric varied, based upon the form and trait writing focus at a given time, the number of criteria within each rubric also varied. Therefore, the total possible score that one could achieve on a given rubric varies from rubric to rubric. Table 6 provides a breakdown of the total values of each rubric. The quantitative data collected from all students' self-assessments of their writing were analyzed using SPSS Software (PASW Statistics 17.0, 2009).

Following each of the five writing units, qualitative data were gathered from

Table 6

Total Values for Student-Generated and Teacher-Created Rubrics

Form + Trait	Student-Generated Rubrics	Teacher-Created Rubrics
Recount + Ideas	Nine criteria with four qualifiers (TOTAL = 36)	Six criteria with four qualifiers (TOTAL = 24)
Report + Organization	Seven criteria with four qualifiers (TOTAL = 28)	Six criteria with four qualifiers (TOTAL = 24)
Persuasive + Sentence Fluency	Six criteria with four qualifiers (TOTAL = 24)	Six criteria with four qualifiers (TOTAL = 24)
Narrative + Voice	Six criteria with four qualifiers (TOTAL = 24)	Seven criteria with four qualifiers (TOTAL = 28)
Procedure + Word Choice	Seven criteria with four qualifiers (TOTAL = 28)	Seven criteria with four qualifiers (TOTAL = 28)

students in both classrooms based upon their personal reflections regarding the writing instruction they had received, as well as their views on assessing their own written work. These student reflections were coded for the development of patterns, categories, and themes. Finally, qualitative data were collected from student interviews with four students; a male and a female student from both the experimental and the control groups. Each of these four students was interviewed at two points throughout the study; once in January/2009 and once in June/2009. All interviews were audiotaped, transcribed, and coded, in order to once again identify patterns, categories, and themes among student responses.

The teacher-researcher and the teacher-participant also provided data for this study, as these individuals taught the two grade 3 classes that were the foci of this study. The teacher-researcher and the teacher-participant provided quantitative data through the scoring of students' written work. These data were analyzed using SPSS Software (PASW Statistics 17.0, 2009). Both teachers also supplied qualitative data based on personal reflections, and two interviews during which the teacher-researcher posed questions to the teacher-participant. These data sources were examined and coded to identify common themes.

The research findings of all data collection measures are discussed in this chapter, beginning with an examination of the quantitative findings.

Quantitative Findings

In this quasi-experimental design, both the experimental and the control groups received integrated instruction on five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, word

choice) of writing, with the expectations of the four strands of the grade 3 science curriculum embedded within writing lessons. The experimental group also received additional cross-curricular science instruction and learning opportunities within the daily literacy block. This entailed exposing students to authentic children's literature and levelled texts containing explicit science content during read-alouds, shared reading lessons, guided reading activities, and literacy centres. As well, students in the experimental group developed self-assessment rubrics, with the guidance of the teacher-researcher, to use during integrated writing instruction. By contrast, the students in the control group were provided with predeveloped, student-friendly rubrics, created solely by the teacher-researcher. Throughout this study, quantitative data were collected to determine the effectiveness of employing an integrated approach to writing instruction, and to establish the efficacy of having primary students self-assess their writing.

Data derived from students' reading levels using the *PM Benchmark Kit* (Nelley & Smith, 2001) were used to show whether the two grade 3 classes were academically comparable in the areas of reading fluency and comprehension. The students' fluency rates were determined using levelled books included within the *PM Benchmark Kit* (Nelley & Smith, 2001). A running record was taken while a given student read a specific levelled text, and the student's fluency rate was then determined by measuring the number of reading errors against the number of words in the text (e.g., 8 errors / 200 words = 0.04 = 96 % fluency rate). An overall level between 1 and 30 (the range for students from JK to grade 3 according to the *PM Benchmark Kit* guidelines) was then assigned to students based on their fluency rates for a given levelled text. Pre- and posttest fluency scores from the two classes were compared using an independent

samples *t*-test (Glass & Hopkins, 1996). For the pretest reading fluency scores there was no statistically significant difference ($t = .52$, $df = 36$, $p = .93$) between the control and experimental groups. The posttest reading fluency scores also indicated no statistically significant difference ($t = -.14$, $df = 36$, $p = .34$) between the two groups.

For each of the passages in the PM Benchmark Kit (Nelley & Smith, 2001), students' reading comprehension levels were determined using a rubric featuring six criteria, each with a maximum qualifier of four. The rubric was totalled out of a possible score of 24, and students' overall reading averages were then determined based on this score. Students' comprehension scores were based on the levelled text that they were able to read with the greatest fluency. Pre- and posttest comprehension scores from the two classes were compared using an independent samples *t*-test (Glass & Hopkins, 1996). The pretest reading comprehension scores showed that there was no statistically significant difference ($t = .59$, $df = 36$, $p = .94$) between the two grade 3 classes. The posttest reading comprehension scores also indicated that there was no statistically significant difference ($t = -.21$, $df = 36$, $p = .15$) between the two classes.

Throughout this study it was also necessary to collect data based on students' pre-existing knowledge of science concepts, in order to validate that both the experimental and control groups shared similar schemas for the content within the grade 3 science curriculum. Data from teacher-devised science tests were initially gathered prior to each of the four science units on Growth and Changes in Plants, Soils in the Environment, Forces Causing Movement, and Strong and Stable Structures (Ministry of Education of Ontario, 2007). Data were then collected from science tests at the completion of each science unit, in order to once again ensure that students shared similar understandings of

science vocabulary and scientific content knowledge. The scores obtained from students' diagnostic (pretest) and summative (posttest) science assessments were measured using independent samples *t*-tests (Glass & Hopkins, 1996). The results of this analysis, outlined in Table 7, show that there were no statistically significant differences (for both the pretest and the posttest) between the two grade 3 classes for any of the four science units that were studied.

The first of several research questions to be examined in this study was to determine whether an integrated approach to writing instruction would assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, and word choice) of writing within science-based written compositions. To answer this question, data from the self-assessments conducted by students in the experimental group were compared at two points (after the completion of the rough drafts and final, published pieces of their writing compositions) for each of the five specific integrated writing units. Students in the experimental group used the student-generated writing rubrics for the self-assessments of their writing. Paired samples *t*-tests (Glass & Hopkins, 1996) were used to determine students' levels of growth in writing from the drafting stage to the publishing (good copy) stage of the writing process.

In Table 8, the means, standard deviations, degrees-of-freedom, and *t*-values can be found for the paired samples *t*-tests (Glass & Hopkins, 1996) of the experimental group's self-assessments of their writing rough drafts and good copies. Four of the five writing compositions (recount + ideas, report + organization, narrative + voice, procedure + word choice) exemplified statistically significant growth ($p < .01$) from rough draft to

Table 7

Independent Samples T-tests of Science Pre- and Posttests for Control and Experimental Groups (N = 38)

Science Strand	Science Pretest Scores			Science Posttest Scores		
	<i>df</i>	<i>t</i>	<i>p</i>	<i>df</i>	<i>T</i>	<i>p</i>
Growth and Changes in Plants	36	1.40	.62	36	3.15	.28
Soils in the Environment	36	3.11	.31	36	-1.45	.10
Forces Causing Movement	36	6.09	.41	36	-1.31	.60
Strong and Stable Structures	36	2.19	.36	36	-9.64	.64

Note. * = $p < .05$, ** = $p < .01$

Table 8

Paired Samples T-tests of Experimental Group's Rough Draft and Good Copy Self-Assessments (N = 18)

Form + Trait	Students' Assessments of Rough Drafts		Students' Assessments of Good Copies		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 36)	25.00	3.55	29.50	4.62	17	-6.14**
Report + Organization (rubric out of 28)	22.44	3.73	25.00	2.30	17	-4.51**
Persuasive + Sentence Fluency (rubric out of 24)	19.50	2.01	20.72	2.30	17	-3.26*
Narrative + Voice (rubric out of 24)	18.11	2.56	20.56	2.46	17	-5.80**
Procedure + Word Choice (rubric out of 28)	20.56	3.17	23.50	3.05	17	-6.30**

Note. * = $p < .05$, ** = $p < .01$

good copy. The fifth piece of writing (persuasive + sentence fluency) also exhibited statistically significant growth ($p < .05$).

Assessment data were also conducted by the teacher-researcher using the student-generated writing rubrics, in order to compare the rough drafts of the experimental students' writing with the final, published copies of these students' compositions. Once again, paired samples t -tests (Glass & Hopkins, 1996) were conducted to establish students' levels of growth in applying the forms and traits of writing in an integrated manner.

In Table 9, the means, standard deviations, degrees-of-freedom, and t -values can be found for the paired samples t -tests (Glass & Hopkins, 1996) of the teacher-researcher's scores for the experimental group's writing rough drafts and good copies. Four of the five writing compositions (recount + ideas, report + organization, narrative + voice, procedure + word choice) exemplified statistically significant growth ($p < .01$) from rough draft to good copy. The fifth piece of writing (persuasive + sentence fluency) also displayed statistically significant growth ($p < .05$).

Students in the control group were also given opportunities to self-assess their writing following the completion of each integrated unit. However, these students utilized the teacher-created versions of the writing rubrics for their self-assessments. As with the experimental group, students in the control group evaluated the rough copies and final published copies of their written work. Paired samples t -tests (Glass & Hopkins, 1996) were also used with the control group to determine growth in students' writing.

In Table 10, the means, standard deviations, degrees-of-freedom, and t -values can be found for the paired samples t -tests (Glass & Hopkins, 1996) of the control group's

Table 9

Paired Samples T-tests of Teacher-Researcher's Scores for Experimental Group's Rough Drafts and Good Copies (N = 18)

Form + Trait	Teacher- Researcher's Assessments of Rough Drafts		Teacher- Researcher's Assessments of Good Copies		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 36)	23.00	3.74	25.56	4.16	17	-3.88**
Report + Organization (rubric out of 28)	19.28	3.75	21.33	3.57	17	-5.92**
Persuasive + Sentence Fluency (rubric out of 24)	16.06	1.35	17.39	2.66	17	-3.06*
Narrative + Voice (rubric out of 24)	13.50	2.77	15.56	2.50	17	-3.35**
Procedure + Word Choice (rubric out of 28)	16.89	2.65	19.56	2.72	17	-4.97**

Note. * = $p < .05$, ** = $p < .01$

Table 10

Paired Samples T-tests of Control Group's Rough Draft and Good Copy Self-Assessments (N = 20)

Form + Trait	Students' Assessments of Rough Drafts		Students' Assessments of Good Copies		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 24)	18.05	3.19	19.80	3.44	19	-3.04*
Report + Organization (rubric out of 24)	17.45	2.98	19.20	3.21	19	-3.38**
Persuasive + Sentence Fluency (rubric out of 24)	16.35	3.99	18.90	3.32	19	-4.95**
Narrative + Voice (rubric out of 28)	17.20	3.85	22.65	3.39	19	-5.99**
Procedure + Word Choice (rubric out of 28)	20.20	2.80	23.80	2.98	19	-5.91**

Note. * = $p < .05$, ** = $p < .01$

self-assessments of their writing rough drafts and good copies. Four of the five writing compositions (report + organization, persuasive + sentence fluency, narrative + voice, procedure + word choice) exemplified statistically significant growth ($p < .01$) from rough draft to good copy. The fifth piece of writing (recount + ideas) also demonstrated statistically significant growth ($p < .05$).

In order to further establish whether students were successful in producing pieces of writing that effectively integrate specific forms and traits of writing, the teacher-researcher and the teacher-participant scored students' pre- and posttest writing assignments for each of the five integrated writing units, using the teacher-created assessment rubrics. Data from students' pre- and posttest written pieces for both the experimental and control groups were collected using paired samples *t*-tests (Glass & Hopkins, 1996) in order to ascertain whether there was growth in students' writing. Table 11 (experimental group) and Table 12 (control group) highlight the teacher-researcher's results of this pre- and posttest scoring.

In Table 11, the means, standard deviations, degrees-of-freedom, and *t*-values can be found for the paired samples *t*-tests (Glass & Hopkins, 1996) of the teacher-researcher's scores for the experimental group's pre- and posttest written compositions. Four of the five writing compositions (recount + ideas, report + organization, persuasive + sentence fluency, narrative + voice) exemplified statistically significant growth ($p < .01$) from pretest to posttest. The fifth piece of writing (procedure + word choice) also exhibited statistically significant growth ($p < .05$).

Table 11

Paired Samples T-tests of Teacher-Researcher's Scores for Experimental Group's Pre- and Posttest Writing Pieces (N = 18)

Form + Trait	Pretest Scores		Posttest Scores		df	t
	M	SD	M	SD		
Recount + Ideas (rubric out of 24)	13.56	3.20	17.11	3.20	17	-6.40**
Report + Organization (rubric out of 24)	10.78	1.83	16.56	2.77	17	-10.83**
Persuasive + Sentence Fluency (rubric out of 24)	11.61	2.33	17.33	2.61	17	-10.46**
Narrative + Voice (rubric out of 28)	15.33	3.71	18.06	3.10	17	-3.84**
Procedure + Word Choice (rubric out of 28)	17.17	3.28	19.44	2.71	17	-2.68*

Note. * = $p < .05$, ** = $p < .01$

Table 12

Paired Samples T-tests of Teacher-Researcher's Scores for Control Group's Pre- and Posttest Writing Pieces (N = 20)

Form + Trait	Pretest Scores		Posttest Scores		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 24)	11.35	3.25	15.25	2.07	19	-6.43**
Report + Organization (rubric out of 24)	12.10	2.53	17.25	2.47	19	-9.55**
Persuasive + Sentence Fluency (rubric out of 24)	11.70	2.72	13.90	3.14	19	-3.51**
Narrative + Voice (rubric out of 28)	15.60	3.76	17.10	2.63	19	-2.21*
Procedure + Word Choice (rubric out of 28)	18.05	3.40	18.50	3.22	19	-0.55

Note. * = $p < .05$, ** = $p < .01$

In Table 12, the means, standard deviations, degrees-of-freedom, and t -values can be found for the paired samples t -tests (Glass & Hopkins, 1996) of the teacher-researcher's scores for the control group's pre- and posttest written compositions. Three of the five writing compositions (recount + ideas, report + organization, persuasive + sentence fluency) exemplified statistically significant growth ($p < .01$) from pretest to posttest, while a fourth piece of writing (narrative + voice) also exhibited statistically significant growth ($p < .05$). The fifth writing assignment (procedure + word choice) displayed no statistically significant growth.

In order to confirm that interrater reliability existed between the teacher-researcher and the teacher-participant throughout this study, a Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) was conducted. Assessing students' writing compositions requires a degree of evaluative judgment (Aiken, 2000). Thus, it is important to ensure that different graders agree on the assigned values of students' written compositions, including the various form- and trait-based aspects of these pieces of writing. The process of determining interrater reliability is such that graders assess writing compositions, and the correlation or intraclass coefficient between the graders' scores is then calculated (Aiken, 2000). For the purposes of this study, the Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) was used to determine the degree of rating integrity between the teacher-researcher and teacher-participant on all students' pre- and posttest writing samples.

In Table 13, the r values can be found for the Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) for the teacher-researcher's scores of students' pre- and posttest writing with the teacher-participant's scores of students' pre- and posttest

Table 13

Interrater Reliability for Teacher-Researcher and Teacher-Participant Scores of Students' Pre- and Posttest Writing

Form + Trait	Experimental Group (Teacher-Researcher's Class; $N=18$)	Control Group (Teacher-Participant's Class; $N=20$)
Recount + Ideas Pretest	.74**	.87**
Recount + Ideas Posttest	.73**	.38
Report + Organization Pretest	.67**	.69**
Report + Organization Posttest	.80**	.85**
Persuasive + Sentence Fluency Pretest	.72**	.74**
Persuasive + Sentence Fluency Posttest	.52*	.89**
Narrative + Voice Pretest	.82**	.74**
Narrative + Voice Posttest	.49*	.58**
Procedure + Word Choice Pretest	.90**	.75**
Procedure + Word Choice Posttest	.82**	.55*

Note. * = $p < .05$, ** = $p < .01$

compositions. Scores for the experimental group exemplified statistically significant correlations ($p < .01$) for the recount + ideas pre- and posttests, the report + organization pre- and posttests, the persuasive + sentence fluency pretest, the narrative + voice pretest, and the procedure + word choice pre- and posttests. Statistically significant correlations ($p < .05$) were also evident for the persuasive + sentence fluency pretest and the narrative + voice posttest.

Scores for the control group demonstrated statistically significant correlations ($p < .01$) for all pre- and posttest writing compositions, with the exception of the procedure + word choice posttest, which showed a statistically significant correlation at the ($p < .05$) level, and the recount + ideas posttest, which displayed no statistically significant correlation.

The focus of the second research question posed for this study was whether a difference existed between the writing compositions of grade 3 students who received focused, content-specific (i.e., science) instruction integrated within the language arts instructional period (i.e., reading, word study, oral and visual communication, media literacy) and the writing compositions of grade 3 students who simply received nonintegrated language arts instruction. Both the teacher-researcher and the teacher-participant used the teacher-created versions of the rubrics to assess students' posttests from all five integrated units. Independent samples *t*-tests (Glass & Hopkins, 1996) were then conducted in order to determine whether differences existed between the posttests of the control and experimental groups. Table 14 (teacher-researcher's scores) and Table 15 (teacher-participant's scores) highlight the results of these independent samples *t*-tests.

Table 14

Independent Samples T-tests for Teacher-Researcher's Scores of Writing Posttests

Form + Trait	Experimental Group		Control Group		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 24)	17.11	3.20	17.25	2.47	36	-.15
Report + Organization (rubric out of 24)	16.56	2.77	17.25	2.47	36	-.82
Persuasive + Sentence Fluency (rubric out of 24)	17.33	2.61	13.90	3.14	36	-3.64**
Narrative + Voice (rubric out of 28)	18.06	3.10	17.10	2.63	36	1.03
Procedure + Word Choice (rubric out of 28)	19.44	2.71	18.50	3.22	36	.97

Note. * = $p < .05$, ** = $p < .01$

Table 15

Independent Samples T-tests for Teacher-Participant's Scores of Writing Posttests

Form + Trait	Experimental Group		Control Group		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Recount + Ideas (rubric out of 24)	16.72	4.34	17.25	2.79	36	-.49
Report + Organization (rubric out of 24)	17.61	3.97	17.30	2.77	36	.28
Persuasive + Sentence Fluency (rubric out of 24)	13.39	3.43	12.85	3.13	36	.51
Narrative + Voice (rubric out of 28)	17.67	3.85	16.10	3.49	36	1.32
Procedure + Word Choice (rubric out of 28)	18.61	2.73	16.10	2.69	36	2.85**

Note. * = $p < .05$, ** = $p < .01$

In Table 14, the means, standard deviations, degrees-of-freedom, and *t*-values can be found for the independent samples *t*-tests (Glass & Hopkins, 1996) of the teacher-researcher's scores for the experimental and control groups' posttest written compositions. The results of the teacher-researcher's scores show that there was a highly significant statistical difference ($p < .01$) on the persuasive + sentence fluency compositions between the two grade 3 classes, with the experimental group scoring significantly higher than the control group. No other statistically significant differences were found for the four remaining writing units.

In Table 15, the means, standard deviations, degrees-of-freedom, and *t*-values can be found for the independent samples *t*-tests (Glass & Hopkins, 1996) of the teacher-participant's scores for the experimental and control groups' posttest written compositions. The results of the teacher-participant's scores show that there were highly significant statistical differences on the procedure + word choice compositions between the two groups, with the experimental group once again scoring significantly higher than the control group. No other statistically significant differences were found on the four remaining writing units.

The third research questions addressed whether grade 3 students could reliably self-assess their written compositions with student-generated rubrics. In order to measure students' abilities to self-assess their writing using the student-generated rubrics, a Pearson product-moment correlation coefficient *r* (Glass & Hopkins, 1996) was conducted comparing students' self-assessments of their writing (from the experimental group) against the teacher-researcher's scores of these students' written work.

Correlations were conducted for both the rough drafts of students' five written pieces, as well as for the final, good copies of students' five writing assignments.

In Table 16, the r values can be found for the Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) of the experimental students' rough draft and good copy writing self-assessments with the teacher-researcher's assessments of these writing products. When considering the rough drafts of the experimental group's written compositions, three of the five writing compositions (recount + ideas, report + organization, persuasive + sentence fluency) exemplified statistically significant correlations ($p < .01$), while the remaining two pieces of writing exhibited no significant correlations.

With respect to the good copies of the experimental students' written work, two of these compositions (recount + ideas, procedure + word choice) displayed statistically significant correlations ($p < .01$), while a third integrated writing piece (report + organization) also exhibited a statistically significant correlation ($p < .05$). The remaining two writing compositions demonstrated no significant correlations.

The fourth and final research question that can be examined using quantitative measures asks whether grade 3 students can reliably self-assess their written compositions with predeveloped rubrics provided by the classroom teacher. Students in the control group completed rough drafts and good copies for each of the five writing units. The good copies (posttests) of these written pieces were scored by the students themselves, the teacher-researcher, and the teacher-participant, using the teacher-created versions of the writing rubrics. A Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) was conducted comparing the teacher-researcher's scores to the

Table 16

Interrater Reliability for Experimental Students' Writing Self-Assessments and Teacher-Researcher's Assessments of Experimental Students' Writing (N = 18)

Form + Trait	Assessments of Rough Drafts	Assessments of Good Copies
Recount + Ideas	.87**	.77**
Report + Organization	.63**	.54*
Persuasive + Sentence Fluency	.66**	.39
Narrative + Voice	.13	.26
Procedure + Word Choice	.34	.62**

Note. * = $p < .05$, ** = $p < .01$

students' assessments of their posttest (good copies) writing, as well as the teacher-participant's scores to the students' posttest writing self-assessments.

In Table 17, the r values can be found for the Pearson product-moment correlation coefficient r (Glass & Hopkins, 1996) of the control students' good copy writing self-assessments with the teacher-researcher's and teacher-participant's assessments of these writing products. When considering the control group's self-assessments with the teacher-researcher's scores, the procedure + word choice compositions exemplified a statistically significant correlation ($p < .01$), while the narrative + voice pieces also indicated a statistically significant correlation ($p < .05$). The remaining three writing compositions demonstrated no significant correlations.

With respect to the control group's self-assessments with the teacher-participant's scores, the procedure + word choice compositions exemplified a statistically significant correlation ($p < .01$), while the persuasive + sentence fluency pieces also indicated a statistically significant correlation ($p < .05$). The remaining three writing compositions demonstrated no significant correlations.

Qualitative Findings

In addition to the quantitative data that were collected throughout this study, qualitative data were examined from students' and teachers' reflections and interviews. Upon analyzing and coding these qualitative data, five predominant themes were revealed. These themes offer insight into students' and teachers' impressions of writing instruction and assessment, as well as curriculum integration, and reflective practice. Three themes emerged from the qualitative data coding that pertain to students' involvement and understandings of writing lessons, self-assessment of writing, and the

Table 17

Interrater Reliability for Control Students' Good Copy Writing Self-Assessments and Teachers' Posttest (Good Copy) Assessments of Control Students' Writing (N = 20)

Form + Trait	Interrater Reliability of Students' Scores and Teacher-Researcher's Scores	Interrater Reliability of Students' Scores and Teacher-Participant's Scores
Recount + Ideas	.06	.30
Report + Organization	.24	.34
Persuasive + Sentence Fluency	.42	.56*
Narrative + Voice	.48*	.33
Procedure + Word Choice	.61**	.67**

Note. * = $p < .05$, ** = $p < .01$

process of reflecting.

The first theme, “Students’ Understandings of the Forms and Traits of Writing,” illustrates how most students were able to define and/or explain to some extent the meanings of each of the five forms and traits of writing. Secondly, “Students’ Self-Perceptions as Writers” was a theme in which students communicated their views on the simplicities and difficulties that they faced when engaged in the process of writing. This led to a third common theme labelled as “Empowering Students with Assessment Tools.” This was clearly a predominant theme, as the grade 3 students in both the experimental and control groups were extremely opinionated in their comments with respect to the rubrics and the act of self-assessing one’s writing. The final two themes deal more specifically with the teacher-researcher’s and teacher-participant’s thoughts on writing instruction and assessment, integrated curriculum, and being a reflective practitioner. As there exist inherent challenges when making cross-curricular connections, “Instructional Considerations when Integrating Curriculum” was identified as a common theme based on the teacher-researcher’s and teacher-participant’s reflections and interviews. Finally, “Transforming Teacher Perceptions of Effective Instructional and Assessment Practices” emerged as a key theme as a result of the changing views of the teacher-researcher and the teacher-participant with regards to their writing instruction and how they evaluate their students. It was through a reflective process that both teachers were able to consider changes and improvements to their instructional and assessment practices. Each of these five themes will now be presented in detail.

Theme 1: Students’ Understandings of the Forms and Traits of Writing

Explicit instruction about the forms and traits of writing played a significant role

in this research study, from both an instructional and an assessment standpoint.

References to the writing forms and traits were embedded within all student reflection prompts and interview questions. In essence, students were asked to provide an explanation, in their own words, of each form and trait of writing. Overall, most students were able to effectively provide basic definitions and explanations of all writing forms and traits.

Forms of Writing

When asked to define recount writing, the most common student response was that “recount writing is writing about something that you had done in your life” (Student Reflections, November, 2008). Other common student responses were that “recount writing is writing about something that has happened to you” and “recount writing is retelling something that has happened” (Student Reflections, November, 2008). During the first of two interviews, Donald, a student in the experimental group, was able to cite specific components about the meaning of a recount, stating that “when I write a recount, I need to include the who, what, when, where, and why” (Donald, Experimental Group, January 15th, 2009). In her reflections, the teacher-participant noted the following:

A few students needed the idea of a recount clarified during lessons and writing tasks, as they automatically began to write a piece of fictional writing, and needed to be reminded that a recount usually stems from a personal experience, and should therefore be based on a real event. (Teacher-Participant, Reflections, November 15th, 2008)

The second form of writing that was studied was report writing. Most students cited phrases when providing information about what it means to write a report such as,

“report writing organizes factual information” and “report writing is finding information about various topics and writing about them” (Student Reflections, January, 2009). All students also recognized that a report is a nonfiction (expository) piece of writing. As Alex stated during one interview, “A report I think is a nonfiction piece that tells about something. It could be a person, or it could be about a place, or a plant, or it could be about an animal. It could be anything (Alex, Control Group, January 17th, 2009). Donald also recognized the expository nature of a written report:

A report is something that you know is real, because when we did the report on the animals, we read it from the book and put it in our own words. Then it’s not like we just thought of it. You know for sure that it’s real. (Donald, Experimental Group, January 15th, 2009)

Donald also expressed that report writing was his favourite form of writing: “When I write a recount, sometimes I forget stuff that’s happened, but the report stuff is right in front of you, like in a book or something” (Donald, Experimental Group, January 15th, 2009).

When explaining the meaning of persuasive writing, most students included such terms as “persuade,” “convince,” and “opinion” within their definitions (Student Reflections, March, 2009). Students initially appeared to demonstrate a considerable understanding of persuasive writing when asked to complete the pretest prompt on whether or not it is important to have recess time at school:

The lesson that was really of high interest to students was the one that we did recently about recess; the persuasion one. They really enjoyed that one and they were very enthusiastic. They really wanted to go and write that down. The class

was able to write fairly good pieces of writing regarding the persuasive piece about recess. (Teacher-Participant, Interview, June 14th, 2009)

However, the teacher-researcher noted the following:

The posttest persuasive piece was much more difficult for students to complete, particularly since this science unit [on Soils in the Environment] had several difficult concepts and vocabulary words. Some students really struggled with the posttest writing task on whether or not composting is a good idea, since many of them could not directly relate or make personal connections to this writing topic. (Teacher-Researcher, Reflections, March 11th, 2009)

Students thoroughly enjoyed the narrative writing unit and most students were able to provide an accurate definition of narrative writing, citing that “a narrative is a piece of fictional writing” (Student Reflections, May 15th, 2009). Narratives also seemed to be the form of writing that students were most frequently asked to write in previous grades. “We got to write a lot of stories last year and I love to make up my own characters and ideas when I’m writing” (Donald, Experimental Group, June 14th, 2009). When asked to describe some of his writing, Alex stated, “I love fiction because I can go all out. I can use the Shape-Go-Map [a graphic organizer] to help me create whatever I want” (Alex, Control Group, June 14th, 2009). Ironically, both the teacher-participant and the teacher-researcher felt that this was the form of writing with which students struggled the most. “This was the most difficult form of writing for students to master, as it does not have a structured outline like many expository forms of writing, yet it appears to be the students’ favourite form of writing” (Teacher-Participant, Reflections, April 30th, 2009). The teacher-researcher observed the following in her students’ narrative pieces:

The length of the narratives varied from student to student, where some wrote short pieces with little character or plot development, and others seemed to write a great deal, but had difficulty closing up their narratives. Some narratives also seemed to contain a good deal of irrelevant information. (Teacher-Researcher, Reflections, May 13th, 2009)

In contrast to narratives, “students had a very good working knowledge of procedural writing prior to receiving instruction on this form, as they had been exposed to this form of writing in earlier grades” (Teacher-Participant, Reflections, June 10th, 2009). Andrea commented, “I know how to write a procedure since we had to do one last year [in grade 2] on building a snowman” (Andrea, Control Group, June 14th, 2009). Comments provided about procedural writing indicated that students were aware that “a procedure involves a series of steps to tell how to make or do something” (Student Reflections, June, 2009). Diana explained that she found procedural writing to be a fairly straightforward task: “I like writing procedures because they’re easy and fun. And sometimes you get to build and make things, like when we made an ice cream sundae for our pretest” (Diana, Experimental Group, June 14th, 2009).

Traits of Writing

Based on the information provided by students within their reflections and interviews, “it appears that the traits of writing are much more abstract than the writing forms, posing greater difficulties for students when having to define and include the traits of writing within their written work” (Teacher-Researcher, Reflection, June 2nd, 2009). The trait of ideas, which was studied alongside the recount writing form, was “fairly difficult for students to comprehend and thus express in their own words” (Teacher-

Researcher, Reflection, December 17th, 2008). Many students wrote that “ideas are words that pop into your head” (Student Reflections, November, 2008). This is an accurate, albeit brief explanation of the trait of ideas. However, four students from the control group confused the trait of ideas with the trait of organization, stating that “ideas are a beginning, middle, and end” (Student Reflections, November, 2008). When asked to provide an explanation of the trait of ideas during his first student interview, Donald claimed, “I forget what traits are” (Donald, Experimental Group, January 15th, 2009). Alex also had difficulty identifying the traits of writing, and when asked to name some of the traits we have been studying, he replied, “Persuasive?” (Alex, Control Group, January 17th, 2009). Diana, on the other hand, explained that the ideas trait is her favourite trait to include in her writing, as “it makes your writing creative and very nice to read” (Diana, Experimental Group, January 17th, 2009). It should be noted that although students generally had difficulty recalling the meaning of the term “traits” and providing a clear and accurate definition of the trait of ideas, nearly half of the grade 3 students made reference to this trait when discussing writing challenges. Many students stated, “I have a hard time coming up with ideas to write about,” when asked what they find most difficult about writing (Student Reflections, October 2008-June 2009).

The trait of organization posed problems for some students as “they automatically assumed that to be organized in one’s writing means to create a piece of writing that is neat and tidy” (Teacher-Researcher, Reflections, December 10th, 2008). However, several students recalled that the trait of organization entails “putting your information in order from beginning to end” (Student Reflections, January, 2009). Nonetheless, when it came to including this trait in their writing, most students omitted or had difficulty including an

effective introduction and/or conclusion. “Students were more familiar with the concepts of organization, introductions, and conclusions when applying these concepts within a narrative writing context. Students generally had some difficulty transferring these understandings to expository writing, such as within their report on plants” (Teacher-Researcher, Reflections, January 9th, 2009).

“The trait of voice is the most abstract of the traits and is therefore the most tedious to teach and the most difficult for students to grasp” (Teacher-Participant, Interview, June 14th, 2009). Several students wrote that “voice is a writer’s personality” (Student Reflections, May 29th, 2009). However, students could not expand upon the implications or significance of this definition, nor could they explain how a writer exhibits personality within one’s writing. “You have to have good personality when you have voice, and sometimes when you’re writing a good story, you have to have good voice, because if you don’t you’re just going to write, ‘Hi, my name is Joe’” (Donald, Experimental Group, June 14th, 2009). Diana commented during her second interview that “voice means that your personality goes into your piece of writing, mostly in stories I think” (Diana, Experimental Group, June 14th, 2009). “Most students eventually grasped that voice entails one’s personality, feelings, and views towards a topic, but had difficulty conveying this trait in their writing” (Teacher-Participant, Reflections, May 15th, 2009). As observed by the teacher-researcher, “not only is the trait of voice a difficult concept for students to understand, but it is also difficult for teachers to explain and present to students, particularly in the primary grades” (Teacher-Researcher, Reflections, April 20th, 2009).

Sentence fluency seemed to be the trait of writing that students could most easily comprehend and apply in their writing. “If you could use good sentence fluency then you could have a good paragraph and a really good piece of writing” (Donald, Experimental Group, June 14th, 2009). Diana commented that “whenever you want to have a good story, instead of writing ‘There was a town,’ you should write ‘There was a dark, scary town’” (Diana, Experimental Group, June 14th, 2009). The teacher-participant concurred, as she felt that her students responded well to sentence fluency instruction:

Students most enjoyed working with this trait when they were given the opportunity, during mini-lessons, to create various sentence beginnings using a sound (e.g., Crash!; Boom!) or a one-word beginning (e.g., Flowers. Flowers are sweet smelling and beautiful). (Teacher-Participant, Reflections, February 25th, 2009)

Similarly to sentence fluency, the trait of word choice was fairly simple for students to grasp, as this trait had been embedded within word study lessons, as well as reading and writing instruction, since the onset of the school year. Students, therefore, had a good working knowledge of such parts of speech as nouns, verbs, and adjectives, as well as adverbs that indicate a position in time (i.e., first, next, after, finally). Many students commented in their reflections that word choice entails “choosing good words for your writing,” or “choosing the right words for your writing” (Student Reflections, June 16th, 2009). Some students could not seem to separate the trait of word choice from the procedural writing form (since these were linked during instruction and assessment for the purposes of this study). Five students, two from the teacher-researcher’s class and

three from the teacher-participant's class, wrote that "word choice is when you use command words to help you write a procedure" (Student Reflections, June 16th, 2009).

Students clearly exhibited differing understandings of the forms and traits of writing that were studied over the course of the year. Interestingly, some traits of writing are more concrete in their design, such as the traits of organization, sentence fluency, and word choice, whereas the traits of ideas and voice are much more abstract concepts, making it more difficult for students to utilize these traits. Similarly, certain forms of writing are much more concrete in their structure, such as the recount, report, and procedure, whereas such forms as persuasive and narrative writing are less tangible in their makeup.

Students not only possessed different impressions of the forms and traits of writing, due to the differences that exist among these writing concepts, but had varying perceptions of the task of writing, as well as how they view themselves as writers.

Theme 2: Students' Self-Perceptions as Writers

Throughout this study, the grade 3 student-participants were given several opportunities to reflect upon and record their thoughts and views on the act of writing, including perceived strengths and challenges that one may experience as a writer, as well as elements that might lead to satisfaction and pride over a given piece of writing.

Students' Perceived Strengths as Writers

Students' levels of satisfaction in their writing were attributed to several factors. First of all, many students felt that the enjoyment one experiences in creating a piece of writing inevitably leads to a stronger piece of written work. In particular, students perceived their writing to be of higher quality if they enjoyed the form in which they

were writing. One of the students in the experimental group commented, “I am proud of this piece of writing because procedures are fun to write” (Student Reflections, June, 2009). A student in the control group also wrote, “I am proud of this piece of writing because it was fun to write a narrative” (Student Reflections, May, 2009). When asked to describe her best piece of writing, Andrea, a student in the control group stated, “The narrative was my best piece of writing because I got to be creative and I made up a story, and I got to make the problem kind of funny” (Andrea, Control Group, June 14th, 2009). Finally, when asked about what makes one proud as a writer, the most common response on students’ reflections was that they were proud of their writing because they had worked hard on it or that they had tried their best. For the students, the amount of time and effort placed into their written work, therefore, seemed to be connected to their perception that they had created a high quality piece of writing.

Based on responses in the students’ reflections and interviews, most students equated writing proficiency with a form of writing (i.e., narrative), and they were able to identify tasks that are simple when engaged in the writing process. When given the following prompt, “For me the easiest part about writing is...,” the most common student response was that “narrative or story writing is easy” (Student Reflections, October/2008-June/2009). The second most common response to this prompt was that “writing the good copy or publishing your work is easy” (Student Reflections, October/2008-June/2009). The teacher-researcher and the teacher-participant found that when students were given opportunities to use graphic organizers such as a Shape-Go-Map (Benson & Cummins, 2000) to assist them in writing their narratives, students found the task of writing to be much easier. Students were also presented with an assistive technology program entitled

SMART Ideas (SMART Technologies, 2010) to aid in the mapping of ideas for their narratives. The teacher-researcher noted that “students have an excellent understanding of graphic organizers (e.g., webs) as planning tools for writing, and can utilize these to help them generate ideas for writing or to develop additional details based on a given topic” (Teacher-Researcher, Reflection, October 29th, 2008). The teacher-participant also noted the following:

Students used the *SMART Ideas* program as an organizer for their narratives, and they really enjoyed the interactive, visual nature of this program. It also seemed to help increase the amount that they wrote and the quality of their writing.

(Teacher-Participant, Interview, June 14th, 2009)

Students' Perceived Challenges as Writers

Students were quite candid when discussing what they find difficult as young writers, since primary students generally find the task of writing to be a challenging one. Interestingly, students felt they experienced few difficulties in applying the forms of writing, but expressed challenges with aspects of writing that relate to the process of writing, as well as the traits of writing. This was evidenced in Donald's interview when he stated, “I like writing, but it's kind of hard because I know what I want to say, but I don't know how to write it down, and I don't know what goes where” (Donald, Experimental Group, January 15th, 2009). When asked to reflect upon the hardest part about writing, the most common student response was that “it is difficult coming up with ideas to write about” (Student Reflections, October/2008-June/2009).

Most students understand that it is important to stick to the main idea or topic of one's writing, and find it amusing when provided with examples of writing in

which the author has gone astray and has veered from the main idea. (Teacher-Researcher, Reflections, October 30th, 2008)

However, “when having to create and develop ideas for their own writing, many students seem to require teacher prompts and additional support to enhance the ideas and details within their writing” (Teacher-Researcher, Reflections, November 2nd, 2008). Diana commented that “if there’s one thing I need help with it’s making my writing longer and putting better ideas into it” (Diana, Experimental Group, January 15th, 2009). When asked to identify things that a classroom teacher could do to help students with their writing, Andrea suggested, “Give the students some ideas and help them understand what the piece of writing is all about” (Andrea, Control Group, January 17th, 2009).

Although many students agreed that they struggle with idea development in their writing, it was also found that creating introductions and conclusions in one’s writing can be an equally difficult task:

Writing an introduction and a conclusion seemed to be the most difficult task for students in their written pieces. Although students seemed to show an understanding of what a conclusion is and why we include conclusions in our writing, it was difficult for students to transfer this knowledge into their own written work. When writing their reports on plants, several students concluded their initial drafts with such remarks as “I hope you enjoyed my report on plants.” Overall, students clearly had difficulty wrapping up their writing and making an explicit link back to the introduction or topic of their writing. (Teacher-Researcher, Reflections, January 20th, 2009)

The teacher-participant also noted the following in her classroom:

When they [the students] went to sit down to write they could not transfer concepts from the lesson very well. Some of them did not have a good introduction in their writing, and I had to remind them about introductions. They also struggled with the conclusions. The only piece of writing that contained a good introduction and conclusion was the persuasive piece of writing on whether or not recess is a good idea. That was the only one that they found easy to do. They really seemed to have a hard time opening and closing the recount and the report. (Teacher-Participant, Interview, June 14th, 2009)

In their reflections, several students also corroborated this challenge, and identified the development and inclusion of effective introductions and conclusions as a difficult task within any form of writing. Students found it particularly daunting to create effective introductions and conclusions when writing a narrative. Alex stated, “I had a really hard time getting started on my narrative and the Shape-Go-Map didn’t really help me to plan my beginning, middle, and end. It just helped me with my characters and stuff” (Alex, Control Group, June 14th, 2009). Diana also claimed, “I like writing narratives but I really don’t know how to get started sometimes. Do I introduce my characters or my setting first? There’s just so much to think about when I’m writing” (Diana, Experimental Group, June 14th, 2009).

It is evident that students can identify strengths and challenges when writing; particularly when given exposure to numerous forms and traits of writing. In order to help students build upon their writing strengths and overcome their writing challenges, assessment tools, such as writing rubrics, can be used as a vehicle for analyzing and improving students’ written compositions.

Theme 3: Empowering Students with Assessment Tools

Throughout the course of this study, grade 3 students in both the experimental and control groups were given copious opportunities to self-assess their written work using rubrics. The students in the experimental group were active participants in developing the rubrics that they would use to assess their writing. Five rubrics were developed with these students over the course of this research, each containing elements that refer to the form and trait that were studied during the five writing units (Appendix D). The students in the control group were provided with equal opportunities to self-assess their writing at five specific points following each of the writing units. However, these students used rubrics that had been previously created by the teacher-researcher (Appendix C). The students in the control group had no prior exposure to these rubrics, nor did they have any part in the development of these student-friendly assessment tools. Comments from the students' reflections and interviews vary a great deal from the experimental group to the control group, and these distinctions will be highlighted in this section.

Experimental Students' Self-Assessment Experience

As the teacher-researcher was an active participant in the development of the rubrics with her students, she initially noted:

It was evident that students had received little exposure to the use of a rubric, and had never actually participated in the development of this type of assessment tool. The process of developing the recount and ideas rubric with the students was fairly long and arduous, taking up more instructional time than expected. By the end of this activity students had begun to lose focus and were becoming restless. (Teacher-Researcher, Reflections, November 30th, 2008)

After this first rubric-writing exercise, the teacher-researcher chose to break up the amount of time spent with students in creating the remaining rubrics into a series of two or three sessions, in order to maintain students' focus and engagement level.

During the collaborative development of the recount and ideas rubric, it was necessary to provide support for students when coming up with the descriptors [vocabulary that describes the criteria within the rubric, featuring such terms as *excellent*, *good*, and *fair*] for each of the four qualifiers of the rubric, as this was a fairly difficult concept for students to articulate. (Teacher-Researcher, Reflections, November 30th, 2008)

However, students seemed to quickly realize that when creating a rubric to assess a written recount, the components of a recount should be included within this assessment tool. Students relied on such key words as *who*, *what*, *when*, *where*, *why*, and *how* to include as descriptors within the rubric, as these are also the main components in writing an effective recount. "Students felt these words [who, what, when, where, why, and how] were the driving force in writing a recount, and they did not hesitate to include all of these components in the recount and ideas rubric" (Teacher-Researcher, Reflections, December 2nd, 2008). Following the completion of the rubric, "students were excited to begin using the rubric to assess their recounts, as they had never used an assessment tool that they had helped to develop to mark their own work" (Teacher-Researcher, Reflections, December 2nd, 2008).

Following the development of each writing rubric, students used these self-assessment tools for both formative and summative assessment purposes. As such, students in the experimental group applied the rubrics in a variety of ways to assist them

in their written pieces and in the self-assessment of their work. During his first interview, Donald remarked, “I liked using the rubrics for my recount and my report, because they helped to make my writing better” (Donald, Experimental Group, January 15th, 2009).

When asked how the rubrics helped improve Donald’s writing, he replied:

I tried to use the rubrics to make some changes from my rough copy to my good copy. On your rough copy you know it’s not going to be perfect. You have to use the rubric to look back at some stuff on your rough copy, try and fix your mistakes, and then copy it all onto your good copy. (Donald, Experimental Group, January 15th, 2009)

Diana shared Donald’s enthusiasm for the use of the rubrics when she commented during her second interview:

I like to look at my rubric to make sure that I’ve included all of my information in my writing. I also use my rubric to make my rough copy better. I usually look at the rubric and see what it says. Like on our narrative rubric it said, ‘I introduce my problem *fairly* well’ for the Level 3 section, and ‘I introduce my problem *very* well’ for a Level 4. I would try to improve my writing by looking at the rubric and trying to write my work out differently, and then see if it sounds better so I could get a Level 4. (Diana, Experimental Group, June 14th, 2009)

In general, the students in the experimental group were very positive in their impressions of the rubric. One common response throughout the experimental group’s reflections was that the rubrics were helpful in assisting them to fix their mistakes from their rough drafts to their final copies (Student Reflections, Experimental Group, October/2008-June/2009). Other common responses were that the rubric was useful in

indicating whether students had produced a Level 1, 2, 3, or 4 piece of writing, and that the rubric helped students to achieve a Level 4 mark in their writing (Student Reflections, Experimental Group, October/2008-June/2009). Finally, many students in the experimental group wrote in their reflections that the rubric was not only useful in helping them to assess their writing, but in providing students with the specific elements (based on the specific form and trait being studied at that particular time) to include in their written work (Student Reflections, Experimental Group, October/2008-June/2009).

The development and use of the rubric[s] appeared to be a rewarding experience for both myself (as the teacher-researcher) and my students. The students seemed to enjoy using the rubrics, I would suspect due to the fact that they were active participants in the development of the rubrics. This opportunity provides students with greater ownership of their work in applying an assessment tool that they've had a hand in creating. This could then lead to an increased interest in using the rubrics to score, revise, edit, and rescore their work. (Teacher-Researcher, Reflections, November 30th, 2008)

Control Students' Self-Assessment Experience

The students in the control group were not as fervent in their acceptance of the rubrics as the students in the experimental group, and were much more reticent to utilize the teacher-created rubrics for the self-assessment of their writing. In fact, the most common conclusion from the control students' reflections was that students did not use the rubric to assist them in the drafting and publishing of their written work (Student Reflections, Control Group, October/2008-June/2009). Most students claimed that this was because they did not like the rubrics or that they did not find the rubrics helpful

(Student Reflections, Control Group, October/2008-June/2009). Several students also commented in their reflections that they did not like using the rubrics because they were hard to use (Student Reflections, Control Group, October/2008-June/2009). When asked whether he found the language in the teacher-created rubrics easy to understand, Alex replied: “Sometimes it’s sort of easy and sometimes it’s really hard” (Alex, Control Group, January 17th, 2009). When asked what could be changed within the rubrics to make them easier to use, Alex felt that “it’s too hard to get a Level 4 in your writing, so the rubrics should be easier so that more kids can get a Level 4” (Alex, Control Group, January 17th, 2009). Interestingly, Alex’s comment addressed the high level achievement within the rubric, but not necessarily the use of the rubric itself. When asked how the rubrics helped her with her writing, Andrea also claimed that she does not use the rubrics. “When I read the rubric I don’t really understand what I’m looking at and which sections are supposed to help me with my writing” (Andrea, Control Group, June 14th, 2009).

The teacher-participant also found the teacher-created rubrics to be challenging, and could empathize with her students’ views when they used these rubrics for the purposes of developing their pieces of writing and self-assessing their work.

What I found very, very difficult was the rubrics. Now it was okay to have one rubric. But after the students had written out their piece they used the first rubric, and then I had to say to them, ‘Alright, now you’re getting another piece of paper and another rubric to work on your good copy.’ And you know what, these students are so young and they’re overwhelmed with all of these papers with rubrics. And the hardest thing to do is to self- evaluate yourself, even as an adult. (Teacher-Participant, Interview, June 14th, 2009).

The teacher-participant also noted that her students were not particularly inclined to use the rubrics appropriately when it came time to self-assess their written work.

A lot of my students didn't use the rubric properly. They would write the piece, and then they would say to themselves, 'Okay, our teacher told us to use the rubric so I'm going to do it quickly.' I know that's what they did. So I would ask them if they really took the time to score themselves honestly on their work, and I would have them go back and think about their self-assessments. But you could tell they weren't really focused on using the rubrics effectively. (Teacher-Participant, Interview, June 14th, 2009)

The teacher-participant indicated that she would have liked to have seen the use of the student-generated rubrics in action within the experimental classroom, rather than having to continually utilize the teacher-created rubrics.

I can imagine that your [the teacher-participant is referring to the teacher-researcher] students are doing a lot better in their writing and on their self-assessments than mine, since they get to use those nice rubrics that you've developed with them. I think you also have a really hard working class and I can see that they're probably performing better than my class on a lot of these writing tasks. (Teacher-Participant, Interview, June 14th, 2009)

It is evident that discrepancies existed between the use of the teacher-created rubrics with students in the control group, and the application of the student-generated rubrics with students in the experimental group. These discrepancies between the two groups highlight a need to more closely examine teachers' writing instruction and

assessment practices, as well as the importance of introducing rubric development and self-assessment opportunities to students.

Theme 4: Instructional Considerations When Integrating Curriculum

The focus of this research centered on the concept of integrated instruction. Not only were five specific traits of writing integrated with five particular writing forms, but the grade 3 Ontario science curriculum (Ministry of Education of Ontario, 2007) was embedded within writing lessons and additional literacy tasks. Several instructional considerations arose during this study due to the magnitude of cross-curricular connections made between the forms and traits of writing, additional literacy skills such as reading and word study activities, and science concepts.

Time Constraints

One of the most predominant subthemes that arose when examining the implications of an integrated curriculum was that of time constraints. The teacher-participant felt that this research endeavour, which involved five integrated writing units along with student self-assessments and reflections, was much too difficult for students to handle. “The units are too heavy and the time constraints of the school year make it difficult to thoroughly complete each [writing] unit in detail” (Teacher-Participant, Reflections, May 13th, 2009). The teacher-participant and the teacher-researcher agreed that “students felt overwhelmed by the writing tasks and the influx of demands being placed upon them during each writing unit” (Teacher-Researcher, Reflections, May 16th, 2009). The teacher-researcher also noted that since this study was conducted within two grade 3 classes, it was necessary to meet all grade 3 literacy and numeracy expectations by early May/2009, in order to prepare these students for the provincial EQAO

assessment. This eventuality placed many unforeseen time constraints on this research study:

I did not realize how short of a window one has to prepare children for this [EQAO] test. This makes it difficult to spend a great deal of time on science activities, when there is so much to cover in the areas of math and literacy to ensure that students are prepared for EQAO. (Teacher-Researcher, Reflections, April 25th, 2009)

The teacher-participant also noted the following:

As educators, we have to keep in mind that little focused, content-specific instruction takes place in December and June, due to a ton of other activities and interruptions during these 2 months. That really only leaves 8 months of true instructional time. (Teacher-Participant, Interview, June 14th, 2009)

However, considering the multitude of curricular expectations that must be met within the school year, “it is necessary to integrate expectations, particularly within the literacy block, in order to successfully complete all subjects and strands by the end of June” (Teacher-Researcher, Reflections, November 19th, 2008). “Linking science and social studies within the literacy block seems to be the perfect fit. This way, there is a little more time to cover everything by May, when the [grade 3] students need to write the EQAO test” (Teacher-Participant, Interview, June 14th, 2009).

Integrating Writing and Science

This study was designed to integrate the writing forms and traits with the grade 3 science curriculum. However, the teacher-researcher observed the following:

By focusing exclusively on the science curriculum during the literacy block (i.e., literacy centres, shared reading, guided reading, word study, writing), other subject areas that would benefit from cross-curricular integration are being overlooked. For example, in previous years I have alternated between the integration of science concepts in my literacy block one week with social studies concepts in my literacy block the following week. Math and the arts are also plausible subject areas to integrate within the literacy block. (Teacher-Researcher, Reflections, April 20th, 2008)

In terms of the integration that took place between the forms and traits of writing for the purposes of this research study, it was initially anticipated that all six traits of writing, including the trait of conventions, would be integrated within six, rather than five forms of writing (the sixth form being explanatory writing). However, the teacher-researcher realized that it would be quite difficult to present six specific integrated units to the grade 3 students over the course of the year. Therefore, five forms and traits of writing were selected by eliminating the conventions trait and the explanatory form of writing. During the course of this study, however, the teacher-researcher came to the following conclusion:

It would be more realistic to focus on four traits and four forms of writing throughout the school year, particularly since the Ontario science curriculum was recently revised, and now consists of only four strands of science within which writing lessons could be integrated. (Teacher-Researcher, Reflections, April 10th, 2009)

The teacher-researcher felt that the conventions trait and the trait of voice could be eliminated as specific foci of a writing unit, as “these traits should not be considered as separate entities, but should be embedded into all facets of language at many given points throughout the school year” (Teacher-Researcher, Reflections, April 10th, 2009). The explanation form of writing could also be eliminated:

This form is very similar to report writing. I’m not sure which other form I might eliminate if I were to limit instruction to four forms of writing, as recount, persuasive, narrative, procedural, and report writing are all equally important forms with which children should become familiar. (Teacher-Researcher, Reflections, April 10th, 2009)

A final consideration of curriculum integration as it pertains to the forms of writing was brought to light by the teacher-participant. The question was posed as to whether poetry could somehow be incorporated into trait-based instruction, as well as in conjunction with science lessons. “Poetry could certainly be integrated into science instruction, as we wrote science haiku as one of our activities when learning about forces and movement” (Teacher-Participant, Interview, June 14th, 2009). The teacher-participant ended her final interview with a significant consideration:

Is it more prudent to teach fewer forms and traits of writing and to then spend more time on each of these areas of writing, or is it better to rush through instruction on six forms and traits of writing over the course of a school year? In the end, what’s best for our students? (Teacher-Participant, Interview, June 14th, 2009)

In light of the abundance of subjects, strands, and expectations within the current Ontario elementary curriculum, it would seem that curriculum integration is a necessity in elementary classrooms. However, the difficulty lies in determining the most effective way to make cross-curricular connections in order to enhance our students' educational experiences.

Theme 5: Transforming Teacher Perceptions of Effective Instructional and Assessment Practices

Throughout the course of this study, both the teacher-researcher and the teacher-participant had copious opportunities to share insights and reflect upon the instruction and assessment practices that took place in both grade 3 classrooms. These educators found themselves questioning the manner in which they planned and implemented classroom instruction, and the approach they took in assessing and evaluating students' writing.

Perceptions of Students' Prior Writing Experiences

One of the first remarks made by the teacher-participant during her second interview was that teachers in general need to be more consistent and comprehensive in their writing instruction, as evidenced by students' difficulties in applying various forms and traits of writing.

I think that my students really struggled with all of the forms and traits of writing. The only form that they found easy to do was the persuasive writing piece about recess time. So even in terms of writing a recount or a report, they struggled with that. They struggled with a recount because I don't think they understood the idea

clearly and they had to be retaught not just once, but a few times, before they understood exactly what a recount was.

They had to be retaught again about all of these writing ideas, and I think the reason is because it's very new to them, and especially at the grade 3 level, these writing concepts shouldn't be new. The students should've had at least some previous exposure to these forms and traits of writing; especially in developing ideas, organizing, and writing good, clear sentences. (Teacher-Participant, Interview, June 14th, 2009)

Following this interview, the teacher-researcher noted the following in her reflections:

There is clearly a lack of consistency within divisions and schools in the teaching of writing. There shouldn't exist such inconsistencies when the curriculum very specifically outlines the expectations to be taught. All educators should be on the same page, and these instructional discrepancies, particularly in the area of literacy, should not occur. (Teacher-Researcher, Reflections, June 14th, 2009)

The teacher-researcher questioned the teacher-participant on the types of writing instruction that she felt students might have received prior to grade 3:

Fiction or narrative writing. Any type of story. However, I found the students' paper and pencil tasks were very limited, and that they hadn't done very much work in the area of writing, of any type of writing, before reaching grade 3. So I find for being in grade 3, these kids had very few good work habits, and their writing skills were very poor. But now I find the writing forms and traits, and everything that we've done so far to be really helpful. It's really helped the students a lot. (Teacher-Participant, Interview, January 15th, 2009)

The teacher-researcher also found that “students’ knowledge of literacy seems to stem more from experience in reading and writing fiction texts than nonfiction pieces” (Teacher-Researcher, Reflections, January 12th, 2009). The teacher-participant recognized that although students initially struggled with several of the forms and traits of writing, the presentation of writing lessons in an integrated manner assisted students in their comprehension and application of writing concepts. The teacher-participant found it particularly helpful to allow students discussion time with the teacher and their peers in order to assist them in better understanding writing lessons:

I think all of the work we have done so far is really great. However, I’ve found that sometimes some of the students find it difficult to write anything down. The best part [of the writing lessons] is when we’re talking about the writing concepts; especially when I can give them [the students] examples in short little paragraphs. I found that very helpful for them, and they enjoyed doing it. (Teacher-Participant, Interview, January 15th, 2009)

The teacher-researcher also allowed for discussion time in her classroom, based on excerpts of pieces of writing that feature specific forms and traits of writing. It was noted that:

Students really enjoy looking at examples of others’ writing, whether these pieces are well-written (Level 4) or poorly written (Level 1). My students use these writing samples to judge their own efficacy as writers by making such comments as ‘Wow, that’s really good!’ or ‘What was that person thinking?’ (Teacher-Researcher, Reflections, December 5th, 2008)

Perceptions of Curriculum Integration

The integration of science and literacy also seemed to assist students in developing and improving their expository writing skills, as evidenced by comments from both teachers.

Ok, well I know the plants study was very interesting and the girls and boys really enjoyed it. We had books at the back of the classroom from the library, and a lot of the boys and girls wanted to have a plants book at their desks when it was independent reading time, and they didn't just look through the books, but they were actually studying the pictures and words, and they really enjoyed it. They also loved the soil unit and they loved looking at the books at the back. They were always finding out new information and talking about new things. They were very interested in the soil unit, because there were a lot of hands-on experiments that were done. So in terms of the reading and the writing, I'm sure whether they were given a fiction or a nonfiction writing task, they would enjoy it. (Teacher-Participant, Interview, January 15th, 2009)

Although the students enjoyed most of the science lessons that were covered over the course of the year, many students did not have a schema for these topics prior to grade 3. This led the teacher-researcher to the following conclusion surrounding the integration of writing and science instruction:

It is now clear to me that students need to be given choice in developing topics for writing, and should be given the opportunity to write on topics for which they have a schema. It is, therefore, difficult for students to write on specific science prompts, particularly if the science unit was a difficult one with higher-level

terminology and content. I think students should still be given opportunities to write about science (or social studies, or math), but they should be given greater choice in the science writing topics, in order to increase their opportunities for learning and success. (Teacher-Researcher, Reflections, May 6th, 2009)

The importance of affording students opportunities to select their own writing topics is perhaps one of the key components in helping students to improve their writing performance. However, in a study of this nature it was necessary to provide students with specific writing prompts. Possibilities certainly exist for modifying this research, in order to grant students greater choice in their writing topics. These possibilities will be discussed in Chapter Five as part of “Implications for Future Research.”

Perceptions of Students' Self-Assessment and Reflection Practices

An important component of this study was to provide students with opportunities to reflect upon writing lessons and activities, as well as the self-assessment process. The act of allowing students to engage in this reflective process was a new learning opportunity not only for students, but also for both the teacher-researcher and the teacher-participant. Prior to this study, neither educator had provided their students with opportunities to complete written reflections in such detail. The teacher-participant commented that the reflection prompts were perhaps a little tedious for students to complete:

I found that the students were getting a little bit tired of writing things down in their reflections. In general, I find my class has difficulty when it comes to the reflection tasks. They have a hard time with it, and it's not totally their fault,

because it is a new task for them this year. (Teacher-Participant, Interview, January 15th, 2009)

The teacher-researcher shared these concerns and noted the following:

Perhaps students could be provided with a writing reflection journal, where they can record a reflection, after completing each piece of writing, in their own way, without having to follow my specific prompts. Students could instead be provided with a series of possible prompts to assist them in their reflections, rather than having to answer the same questions and reflection pieces each time they write. (Teacher-Researcher, Reflections, January 15th, 2009)

When asked to elaborate on the student reflection process, and how this process might be refined, the teacher-participant stated:

That's a very good question. I try to tell the students that there will be no marks for this because it's a reflection, and I try to tell them that they can put down whatever they want; whatever they think. I said to them, 'Whenever it's your idea it's not going to be wrong.' But they seem to be inhibited and frightened of being reprimanded if their reflection comments aren't positive. If they want to say something negative they feel like they might get into trouble, even though I told them not to worry and that they could write anything, positive or negative. But I think the students may need to have more time and more opportunities to complete reflections not just after they've done a piece of writing, but in anything. This would definitely help to improve how they think about and engage in doing reflections. (Teacher-Participant, Interview, January 15th, 2009)

Clearly, both the teacher-researcher and the teacher-participant benefited a great deal from their roles in this study. By utilizing an integrated approach to curriculum, as well as introducing the concepts of self-assessment and reflection to their students, both teachers have forever changed the manner in which they approach writing instruction and assessment.

Chapter Summary

This research examined two groups of grade 3 students and their abilities to understand and apply specific forms and traits of writing. This study also focused on grade 3 students' aptitude in self-assessing their written work. The following chapter summary highlights the findings of this study with specific reference to each of the research questions.

When examining the first research question, which asked whether an integrated approach to writing instruction can assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, and word choice) of writing within science-based written compositions, significant differences were found for all five writing units from students in both the experimental and control groups. The results of these paired samples *t*-tests (Glass & Hopkins, 1996) were based on a comparison of students' self-assessments of their written rough copies versus the final, published copies of their work. The teacher-researcher's scores also showed statistically significant differences not only between all rough drafts and published copies of the experimental students' written work, but between the pre- and posttest scores for all five of the experimental groups' writing units. The results of the teacher-researcher's scores on the pre- and posttests of the

control group's writing show statistically significant differences for all writing units, apart from the narrative and voice integrated unit, which showed no statistically significant difference.

The second research question was posed to establish whether differences existed between the writing compositions of the experimental group (who received additional science instruction within the literacy block) and the control group (who did not receive the treatment). Independent samples *t*-tests (Glass & Hopkins, 1996) were conducted using the posttest scores assigned to students' work from both the teacher-researcher and the teacher-participant. It should be noted that both the teacher-researcher and the teacher-participant displayed a high degree of interrater reliability for the scoring of all writing pre- and posttest tasks, with the exception of the recount posttest.

The results of the teacher-researcher's scores on the independent samples *t*-tests (Glass & Hopkins, 1996) show that there were highly significant statistical differences on the persuasive writing pieces between the two grade 3 classes, with the experimental group scoring significantly higher than the control group. No other statistically significant differences were found for the four remaining writing units. The results of the teacher-participant's scores show that there were highly significant statistical differences on the procedural writing pieces between the two groups, with the experimental group once again scoring significantly higher than the control group. No other statistically significant differences were found on the four remaining writing units.

The third research question required the use of Pearson product-moment correlation coefficient *r* tests (Glass & Hopkins, 1996) to determine whether the grade 3 students in the experimental group, who used the student-generated rubrics, could

reliably self-assess their writing. Scores from the students in the experimental group were compared with the teacher-researcher's scores for both the rough drafts and final copies of students' written work. There was a strong, positive correlation between the teacher-researcher and the experimental students for the recount, report, and persuasive writing rough drafts, with no correlation on the narrative and procedural writing rough drafts. There was also a strong, positive correlation between the teacher-researcher and the experimental students for the recount, report, and procedural writing published pieces, with no correlation on the persuasive and narrative writing published compositions.

The fourth research question required the application of Pearson product-moment correlation coefficient r tests (Glass & Hopkins, 1996) to determine whether the grade 3 students in the control group, who used the teacher-created rubrics, could reliably self-assess their writing. Since the teacher-researcher and the teacher-participant only scored the control students' final, published (posttest) portions of their written compositions, Pearson product-moment correlation coefficient r tests (Glass & Hopkins, 1996) were conducted using control students' posttest scores against both teachers' posttest scores. There was a positive correlation between the teacher-researcher and the control students for the narrative and procedural writing posttests, with no correlation for the recount, report, and persuasive writing posttests. There was also a positive correlation between the teacher-participant and the control students for the persuasive and procedural writing posttests, with no correlation for the recount, report, and narrative writing posttests.

The analyzed qualitative data revealed five themes which helped to develop an understanding of students' awareness of the forms and traits of writing after receiving an integrated approach to writing instruction. These qualitative themes also helped to reveal

how the self-assessments and reflections of grade 3 writers can be used to guide teachers in their instructional decision making.

In examining the theme of “Students’ Understandings of the Forms and Traits of Writing,” it was found that students in both the control and experimental groups gleaned a general understanding of the forms and traits of writing from writing lessons and opportunities to produce integrated compositions. However, students had greater difficulty defining the traits of writing and incorporating these in their written work.

The theme of “Students’ Self-Perceptions as Writers,” highlighted that overall, students in both the experimental and control groups were able to communicate their strengths and weaknesses as young writers. Students’ perceived strengths as writers seemed to stem from the enjoyment they experienced in writing about a given topic. Students seemed to most enjoy writing narratives, and, therefore, many students felt that the narrative was their best piece of writing. On the other hand, many students admitted to experiencing difficulties in developing and sticking to ideas in their writing, as well as utilizing the trait of organization to include effective introductions and conclusions in their written work.

The theme “Empowering Students with Assessment Tools” stemmed from the opportunities that students were given to self-assess their written work and to utilize these self-assessments to assist them in revising and editing the rough drafts of their writing. Based on reflections and interviews, students in the experimental group, who had the opportunity to collaboratively develop writing rubrics with the teacher-researcher, experienced greater ease and comfort in using these assessment tools than the control group. Students in the control group, who were provided with predeveloped rubrics

created by the teacher-researcher, demonstrated little interest in using the rubrics, and found the application of these assessment tools to be quite challenging.

With respect to “Instructional Considerations when Integrating Curriculum,” both the teacher-researcher and the teacher-participant felt that it was difficult to meet the timelines in delivering a year-long writing plan that involved the presentation of five forms and traits of writing. However, both teachers also felt that it is necessary to integrate subject areas and subject strands if one is to meet all of the expectations within the Ontario curriculum in a timely manner.

Finally, in “Transforming Teacher Perceptions of Effective Instructional and Assessment Practices,” it was found that both the teacher-researcher and the teacher-participant agreed there needs to exist greater consistency and comprehensiveness among educators in writing instruction and assessment practices. In particular, students need greater exposure to expository texts and writing activities in the primary grades and beyond. Both teachers also believed that students should receive continuous opportunities to self-assess and reflect upon their writing, and students should be given greater ownership for both the self-assessment and the reflection processes.

The results of this study will be discussed in detail in Chapter Five, highlighting implications for educational theory, instructional practice, and further research.

CHAPTER FIVE: SUMMARY, DISCUSSION, AND IMPLICATIONS

Writing is an essential skill for children to master in light of their need to communicate in a global community exploding with print. Writing, however, is no easy task; it requires an understanding of the processes involved in composing, as well as knowledge of specific writing traits and written forms. Unfortunately, children in the primary grades are typically exposed to a limited number of writing forms and traits, with much emphasis placed on the development of narrative (fiction) compositions.

The purpose of this study was to explore the effects of an integrated writing curriculum, which linked specific written forms, writing traits, and science concepts, on grade 3 students' writing achievement. Through the use of teacher-created and student-generated assessment tools (i.e., rubrics), as well as student and teacher reflections and interviews, the ability of grade 3 students to create high quality written compositions was examined. A summary of the study will now be provided, along with a discussion of the findings and an examination of the implications of the results.

Summary of the Study

In this study, an integrated writing instruction program was used in two grade 3 classrooms to examine the impact such a program might have on primary students' achievement in writing. Self-assessment, as a tool to assist students in improving the quality of their writing, was also examined throughout this study. Finally, student and teacher reflective practices were documented, in order to determine whether personal reflections could assist students in improving their work, while aiding educators in honing their instructional and assessment practices.

At the onset of this research, it was necessary to collect baseline information on all students' reading fluency and comprehension levels. This information was used to ensure that students were achieving at similar reading levels, and that differential reading competence did not contribute to differences in students' written compositions. Reading assessments were also conducted at the completion of this study to once again ensure that students had progressed in reading achievement at similar rates through the duration of the study. Independent samples *t*-tests (Glass & Hopkins, 1996) were used to determine whether there was a difference in reading scores between the two classes. It was found that for both the pre- and post reading assessments for fluency and comprehension, there were no significant differences between the two grade 3 classes.

In an attempt to create a successful, well-rounded writing program, five traits of writing were melded with five forms of writing. These writing combinations were then integrated within a specific strand of the grade 3 Ontario science curriculum (Ministry of Education of Ontario, 2007) to create five units that would be presented to students in 5-week sessions. These cross-curricular triads were as follows: 1) ideas + recount + Growth and Changes in Plants; 2) organization + report + Growth and Changes in Plants; 3) sentence fluency + persuasive + Soils in the Environment; 4) voice + narrative + Forces Causing Movement; 5) word choice + procedure + Strong and Stable Structures. An intervention study was conducted, whereby the experimental group not only received the writing instruction combining specific traits and forms of writing, but additional cross-curricular learning opportunities within the daily literacy block. This entailed exposing experimental students to authentic children's literature and levelled texts containing explicit science content during read-alouds, shared reading lessons, guided reading

activities, and literacy centres. The control group received the same instruction as the experimental group on the specific forms and traits of writing, as well as science content instruction. However, the control group did not receive the additional cross-curricular, science-based learning opportunities within their daily literacy block.

At the beginning of each new writing unit, a science assessment was administered to students in both grade 3 classes to determine students' preexisting knowledge of the science content that would be presented. These assessments were administered, as prior knowledge of science concepts and content-area vocabulary might have impacted on the students' writing (i.e., ideas and word choice traits). Science assessments were also administered at the conclusion of each 5-week unit in order to record students' growth in content-area knowledge and vocabulary, potentially impacting on the quality of students' writing. Independent samples *t*-tests (Glass & Hopkins, 1996) were conducted to determine any differences that may have existed between the two grade 3 classes in their understanding of science concepts. There were no statistically significant differences in knowledge of science content between the two grade 3 classes for any of the four science units that were studied.

Prior to each 5-week writing unit, students were asked to complete a writing pretest based on the particular form of writing that would be studied with a given writing trait and science strand. For example, the first writing unit was based on the *recount* form of writing, so students were asked to write a recount about a musical presentation they had attended in the school gymnasium. Following each 5-week writing unit, students in both grade 3 classes were asked to create a piece of writing based on a specific prompt provided by the teacher-researcher. These prompts were science-based, and related

directly to the science content that had been studied with the trait-based and form-specific writing instruction. Once students had completed a rough draft of their writing, they were provided with one of two rubrics: either a teacher-created rubric (control group), or a student-generated rubric that had been developed collaboratively by the teacher-researcher and her students (experimental group). Students were asked to use these rubrics to self-assess their written rough drafts and then assist them to create a good, published copy of their written work. When the good copies of their compositions were completed, students were asked to re-assess these final pieces using a new copy of their respective rubrics.

Since the teacher-researcher and the teacher-participant both engaged in the scoring process for all of the experimental and control groups' pre- and posttest written compositions, it was necessary to conduct Pearson product-moment correlation coefficient r tests (Glass & Hopkins, 1996) to determine the level of interrater reliability between the two teachers. Results indicated that significant correlations existed between the teacher-researcher's and teacher-participant's scores on all pieces of students' writing, with the exception of the control group's recount + ideas posttest, which showed no significant correlation.

To determine whether an integrated approach to writing instruction would assist grade 3 students in effectively applying specific traits of writing in compositions of different forms, various paired samples t -tests (Glass & Hopkins, 1996) were conducted. First of all, experimental students' rough copy writing scores were compared to their final (good copy) writing scores for each of the five writing compositions. There were significant differences for all five pieces of writing. The teacher-researcher's assessments

of the experimental students' rough and good pieces were then compared to each other using paired samples *t*-tests (Glass & Hopkins, 1996). These results also demonstrate significant differences for all five written compositions. The control students' rough copy writing scores were also compared to their final writing scores using paired samples *t*-tests (Glass & Hopkins, 1996). The results of these analyses indicate significant differences on all five writing units. Finally, the teacher-researcher's scores for both the experimental and the control students' pre- and posttest written pieces were measured using paired samples *t*-tests (Glass & Hopkins, 1996). These analyses indicated that there was significant growth in all experimental students' written compositions. Significant growth was also noted in all of the control students' written compositions, with the exception of the procedural writing + word choice piece, which showed no significant growth.

To establish whether there were differences between the writing compositions of grade 3 students who received focused, content-specific instruction integrated within the language arts instructional period and the writing compositions of grade 3 students who simply received nonintegrated language arts instruction, both the teacher-researcher and the teacher-participant used the teacher-created versions of the rubrics to assess students' posttests from all five writing units. Independent samples *t*-tests (Glass & Hopkins, 1996) were conducted in order to determine whether differences existed between the posttests of the control and experimental groups. The results of the teacher-researcher's scores indicate that significant differences exist between the two groups solely on the persuasive + sentence fluency writing task. The results of the teacher-participant's scores indicate

that only the procedure + word choice compositions exhibited significant differences between the two groups of grade 3 students.

To ascertain whether grade 3 students could reliably self-assess their written compositions with student-generated rubrics (experimental group) and/or with predeveloped rubrics provided by the classroom teacher (control group), Pearson product-moment correlation coefficient r tests (Glass & Hopkins, 1996) were conducted. The results of the teacher-researcher's scores when compared to the experimental students' scores show significant correlations for most pieces of writing. The persuasive + sentence fluency good copy, both the rough and good copies of the narrative + voice, and the procedure + word choice rough draft were the only compositions to show no significant correlations. The Pearson product-moment correlation coefficient r tests (Glass & Hopkins, 1996) conducted on the control group showed few correlations between the teacher-researcher's scores and the control students' assessments, as well as the teacher-participant's scores and these students' assessments. The teacher-researcher's and control group's scores show significant correlations on the narrative + voice and the procedure + word choice compositions, while the teacher-participant's and control group's scores show significant correlations for the persuasive + sentence fluency and procedure + word choice pieces of writing.

Students in both the experimental and control groups completed writing reflections after each 5-week writing unit. The reflection prompts were designed by the teacher-researcher to guide students in providing their thoughts on the writing components of the unit, strengths and obstacles they may have faced as writers, and the self-assessment process. Both the teacher-researcher and the teacher-participant also

recorded reflections surrounding the writing instruction and assessment practices of this study. Student interviews were conducted by the teacher-researcher with two students from each of the grade 3 classes. These interviews took place at two points throughout the study. The teacher-participant was also interviewed by the teacher-researcher twice throughout this study. The student and teacher interviews were audiotaped and transcribed by the teacher-researcher. For the purposes of this study, all qualitative data were analyzed and coded for common themes. Once all of the qualitative data were cross-compared from all participants in this study, five themes emerged: (a) “Students’ Understandings of the Forms and Traits of Writing,” (b) “Empowering Students with Assessment Tools,” (c) “Students’ Self-Perceptions as Writers,” (d) “Instructional Considerations when Integrating Curriculum,” and (e) “Transforming Teacher Perceptions of Effective Instructional and Assessment Practices.” These themes were used to draw conclusions on the efficacy of combining specific traits and forms of writing alongside the grade 3 Ontario science curriculum, as well as the value of having students engage in the process of self-assessment.

In general, results of both the quantitative and qualitative findings indicate that through a writing instruction program that combined various forms and traits of writing with science concepts, students were able to articulate the meanings of the forms of writing more accurately than the traits of writing. However, students in both groups made significant gains in their writing performance from pretest to posttest, indicating that students inherently developed an understanding of the integrated writing and science concepts within this study. Although both groups of grade 3 students were given opportunities to utilize writing rubrics for the self-assessment of their work, the data

suggest that not only did the students in the experimental group (who used the student-developed rubrics) show greater improvements in their writing performance than the control group, but they valued the self-assessment experience more than the control students. This was exemplified in the student interviews and reflections, and was echoed by the teacher-researcher and the teacher-participant. In sum, these findings indicate that a program that links specific forms and traits of writing with other areas of the curriculum (i.e., science), and affords students opportunities to develop and utilize writing rubrics for the purpose of self-assessment, is one that will assist students in increasing their writing performance and enhancing their interest in writing.

Discussion

This section of the study will discuss the findings, in an attempt to gain an understanding of the effectiveness of an integrated approach to writing instruction, as well as the efficacy of having students utilize rubrics to self-assess their written work. Implications of these findings will also be discussed from a practical and a theoretical standpoint in order to provide greater insight to educators and educational researchers.

The Impact of an Integrated Writing Curriculum on Students' Writing Performance

The first research question sought to determine whether an integrated approach to writing instruction would assist grade 3 students in effectively applying five specific forms (recount, report, persuasive, narrative, procedure) and traits (ideas, organization, sentence fluency, voice, word choice) of writing within science-based written compositions. The results of paired samples *t*-tests (Glass & Hopkins, 1996) assisted in answering this question. There were significant to highly significant differences between the experimental students' self-assessments of their writing rough drafts and their good

copies for all five writing units. The experimental group, who utilized the student-generated rubrics to self-assess their writing, demonstrated the greatest amount of growth from rough draft to good copy on the recount + ideas ($t = -6.14, p < .01$) and procedure + word choice ($t = -6.30, p < .01$) written compositions. The control group, who utilized the teacher-created writing rubrics to self-assess the rough and good copies of their work, also displayed significant growth on all five writing compositions. The narrative + voice ($t = -5.99, p < .01$) and procedure + word choice ($t = -5.91, p < .01$) compositions showed the most significant measures of growth among the students in the control group. The results of the experimental and control groups' paired samples *t*-tests (Glass & Hopkins, 1996) will now be discussed in greater detail.

The students in the experimental group assigned themselves fairly low scores on the rough drafts of their recount + ideas pieces ($M = 25.00$ out of a possible 36), paving the way for improvement on the good copies of these recounts. The recount + ideas compositions were the first pieces of writing that students were asked to compose for this study. These were also the first compositions that students were asked to self-assess. The task of self-assessment was a new one for students, and may have been accompanied by a sense of excitement and engagement. The experimental students had the opportunity, for the first time, to utilize a rubric that they had, in fact, created, with some assistance from the teacher-researcher. Andrade, Du, and Wang (2008) suggest that students should be involved in the design of writing rubrics, and that students should be explicitly taught to self-assess their work in order to help improve their writing performance. In this study, the experimental students were explicitly taught how to develop and apply writing rubrics in their work. These students took the process of developing the recount + ideas writing

rubric very seriously. In turn, the experimental students scored themselves in a fair manner rather than rushing through the self-assessment process and, consequently, assigning themselves high scores (i.e., Level 3 and 4 scores) on most areas of the rubric. According to Andrade (2008), when students are taught to understand the value of self-evaluation, they can learn to more accurately self-assess their own work. Since this was the first rubric collaboratively developed by the teacher-researcher and the experimental group, a considerable amount of time was spent negotiating criteria that should be included within the rubric, as well as how the content of the rubric should be worded. The content of the rubric was well-discussed and internalized by the experimental students, which would have made it easier for them to utilize this assessment tool. This aligns with Andrade's (2001) views that it is important to negotiate the criteria within a rubric with students and to discuss the content of these assessment tools, since simply providing a rubric to students without any discussion is unlikely to improve the quality of students' work. A high degree of growth from rough draft to good copy may have also occurred on the experimental group's recount + ideas compositions given that these students took the task of using the rubric to revise and edit their work very seriously. Having students utilize rubrics to formatively assess their work is often overlooked by educators (Bingham, Holbrook, & Meyers, 2010; Black & Wiliam, 1998). However, according to Black and Wiliam (1998), formative assessment is essential if students are going to become effective self-assessors of their work.

When anyone is trying to learn, feedback about the effort has three elements: recognition of the desired goal, evidence about one's present position, and some understanding of a way to close the gap between the two. All three must be

understood to some degree before any action can be taken to improve learning.

(Black & Wiliam, 1998, p. 143)

In this study, both the experimental and control groups were, in fact, given opportunities to apply the writing rubrics in a formative manner to consider the quality of their rough drafts, and to make revisions to their compositions. The experimental group was successful in using the recount + ideas rubric in a formative manner, as there was a marked improvement in the good copies of their recounts.

On the other hand, the students in the control group displayed the least amount of growth on the recount + ideas compositions, albeit their growth was still significant ($t = -3.04, p < .05$). The control students assigned themselves the highest scores on their recount rough drafts ($M = 18.05$ out of a possible 24), leaving little room for improvement when creating their good copies. Perhaps this is due to the fact that recount writing is considered to be one of the simplest forms of writing for students to master. According to Stead (2002), young children are naturally drawn to recount writing, and can, therefore, easily make the connection to nonfiction topics when composing recounts. A recount stems from personal experience and allows students to delve into their schemata for the ideas to include within this form of writing. The recount form and the trait of ideas were purposefully connected for this study, as it was assumed that students would have had some prior knowledge of recount writing and idea development. In fact, Culham (2005) posits that the trait of ideas is one that primary students should be familiar with before they are even able to write texts of a considerable length. As such, the control students may have had little difficulty contending with the trait of ideas, due to their familiarity with this trait.

A second possibility for the control students' minimal growth on the recount + ideas compositions may be that these students were inexperienced at utilizing rubrics and completing self-assessments of their writing. In order for students to benefit from the use of rubrics as self-assessment tools, students must be properly introduced to rubrics and must be given opportunities to become familiar with these assessment tools (Jackson & Larkin, 2002). The control students, in fact, suffered from a lack of time spent engaged in the rubric devising process and, thus, may not have been 'invested' in the practice of self-assessment. In turn, the control students may not have taken the self-assessment process seriously, leading to inflated writing scores.

Students in the control group made much greater gains in their narrative + voice pieces. The control students initially assigned themselves fairly low scores ($M = 17.20$ out of a possible 28) for their narrative + voice rough drafts. Both the teacher-researcher and the teacher-participant noted that the narrative piece was a difficult one for students as there is little set structure to narrative writing in general, unlike certain forms of expository writing (i.e., procedural and report writing) where ideas can be outlined in an organizer, and then expanded upon using information from various outside sources. Although narrative pieces can be planned using an organizer such as a Shape-Go-Map (Benson & Cummins, 2000), which allows students to outline such narrative features as characters, setting, problem, events, and conclusion; the observations and findings of this study indicate that it is much more difficult for students to expand upon these narrative ideas once their outline is complete. Most elementary school students are expected to compose written narratives, beginning in the primary grades, yet children often struggle in planning a narrative, generating ideas for their composition, revising their work, and

monitoring themselves as they write (Patel & Laud, 2009). This contradicts the majority of existing research on narrative writing, which suggests that students are capable of composing narratives with considerable ease and find it more difficult to create writing compositions of an expository nature, as students are not often exposed to nonfiction forms of writing (Chapman, 2002; Gambell, 2001; Purcell-Gates et al., 2007; Wollman-Bonilla, 2000). However, in this researcher's opinion, students need to be highly creative when composing a narrative, rather than relying on personal experience or factual information in other forms of writing (i.e., recount, report, procedure). This reliance on sheer creativity and idea development leads to difficulties in writing pieces of fiction. The trait of voice is also a difficult one for students to comprehend, and it may have taken some time for students to refine this trait in their written work. According to Culham (2005), "voice is a complex quality of writing, difficult to describe and, therefore, difficult to teach. However, voice is the driving force behind effective writing, so the sooner we introduce it to students, the better" (p. 138). In retrospect, the link made between the narrative form of writing and the trait of voice may have been overwhelming for some students, as the trait of voice is quite abstract and at times confusing for students and teachers.

The results of paired samples *t*-tests (Glass & Hopkins, 1996) indicate that highly significant growth occurred from the drafting to the publishing stage of the experimental group's procedure + word choice writing pieces. This was exemplified in both the teacher-researcher's assessments of students' work, as well as the experimental students' own self-assessments. Initially, the experimental students struggled with the procedure + word choice posttest activity, as this task was much more complex than the procedure +

word choice pretest, in which students were asked to write a procedure for making an ice cream sundae. The posttest task was difficult as students were required to generate an idea for a structure they could build that would display stability and strength (as per the science focus on “Strong and Stable Structures”). Students then had to write a procedure explaining how to build their structure. The experimental students effectively used the self-assessments of their rough drafts to revise and edit their work, and as a result were able to produce improved good copies of their procedures. An enhanced understanding of the trait of word choice, following further classroom discussion and modeling may have been a factor in students’ growth from rough draft to good copy. Culham (2005) posits that it is essential for students to have exposure to well-crafted language through oral communication and reading on a daily basis. According to Culham (2005), this increased exposure to higher-level vocabulary will lead to improvements in students’ use of words in their writing. During the procedure + word choice posttest, several students initially omitted key verbs (e.g., cut, glue, stack, fold) and adverbs (e.g., first, next, then, finally) within their rough drafts when outlining the steps of their procedure. Interestingly, Culham and Coutu (2008) submit that during the drafting stage of writing, students should focus on recording their ideas on paper, and it is only when revisions are being made that students should concentrate on greater precision in their use of words. Consistent with this view, once students considered the rubric and were reminded of the focused lessons on the trait of word choice, additional key words were included within the good copies of students’ procedures, thus improving the quality and flow of their writing.

Results of the teacher-researcher's scores, based on the paired samples *t*-tests (Glass & Hopkins, 1996) of the experimental group's rough and published written work, indicate that the greatest amount of student growth occurred on the report + organization compositions. Initially the experimental students appeared to face challenges in incorporating an effective introduction and conclusion within their reports, as the students were told that these organizational components should not be paraphrased from other sources (e.g., informational text or websites), but should be based on their own words and ideas. As such, some students either omitted an introduction and/or a conclusion, or chose to write one-word sentences that briefly opened and closed their reports. Culham (2005) found that the trait of organization is often the most difficult writing trait for students to master, as this trait of writing is not typically taught within a full range of quality narrative and expository genres. However, after utilizing the rubric for self-assessment purposes and engaging in further classroom discussion on creating effective introductions and conclusions, students demonstrated a marked improvement in their reports.

Research on persuasive writing skills in elementary students suggests that developing a persuasive argument is an extremely demanding task for young writers, making persuasive writing one of the most challenging written forms of communication (Nippold, Ward-Lonergan, & Fanning, 2005). Although both the experimental students' and teacher-researcher's scores indicated significant growth from rough draft to good copy on the persuasive + sentence fluency piece of writing, overall, it was this composition that displayed the least amount of growth of the five writing units. Students in the experimental group initially assigned themselves fairly high scores on the rough drafts of their persuasive + sentence fluency pieces ($M = 19.50$ out of a possible 24). This

suggests that these students possessed a fairly good understanding of the posttest writing prompt (on whether or not it is a good idea to adopt a composting program at home and at school), and they were, accordingly, confident in the quality of their rough drafts. The topic of 'composting' was discussed in considerable depth in the classroom, and several scientific experiments were conducted so that students might develop a better understanding of the composting process. Students were highly engaged during these science lessons. This engagement may have, therefore, impacted on the high rough draft scores that the experimental students assigned themselves, leaving a small margin for growth in their final persuasive writing + sentence fluency pieces. Interestingly, the teacher-researcher felt that the persuasive + sentence fluency writing prompt was one of the most difficult writing activities for students to complete, as her students required ample guidance in generating ideas throughout this activity. However, the experimental group had a particularly good understanding of the trait of sentence fluency. Consequently, students' command of the trait of sentence fluency may have also contributed to the elevated scores that students assigned themselves for the persuasive + sentence fluency writing posttest.

The teacher-researcher and the teacher-participant scored all of the experimental and control students' pre- and posttest written work using the teacher-created rubrics. Recall that the teacher-researcher and the teacher-participant scored with a high degree of interrater reliability, therefore, only the teacher-researcher's scores and paired samples *t*-tests (Glass & Hopkins, 1996) results are featured in this study. Highly significant growth was observed from pretest to posttest for the experimental and control students' report + organization pieces. All of the grade 3 students had a great deal of exposure to lessons

and hands-on activities dealing with plants. The writing prompt for the report + organization posttest was, in fact, to develop a report on plants, whereby students were asked to provide a detailed description of the various parts of a plant (i.e., seed, roots, stem, leaves, flower). Due to the inclusion of science content within writing lessons, it appears that students in both grade 3 classes demonstrated considerable background knowledge on plants and incorporated this knowledge within their reports. Concurrently, in the work of Klentschy and Molina-De La Torre (2004), these researchers highlighted the importance of linking science and writing instruction in order to assist students in strengthening their overall literacy skills.

The experimental and control groups also demonstrated substantial growth from pretest to posttest on all other writing units, with the exception of the control group's results on their procedure + word choice ($t = -2.68, p < .05$) compositions. Interestingly, the results of the paired samples *t*-tests (Glass & Hopkins, 1996) indicate that the experimental students exhibited significant growth on their procedure + word choice compositions, yet the control group displayed no significant growth in this area. These findings suggest that the students in the experimental group may have, indeed, benefited from the additional science-based learning opportunities they received during their literacy block. This discussion point will be examined in greater detail in the next subsection.

As a primary teacher, it is extremely encouraging that students appeared to be successful in their application of the forms and traits of writing within science-focused compositions. Due to the significance of the results of all paired-samples *t*-tests (Glass & Hopkins, 1996), as well as information gleaned from students' reflections and interviews,

students seemed to continually grow in their understandings of the forms and traits of writing, as well as their knowledge of the writing process, as each writing unit progressed. Results of the independent samples *t*-tests (Glass & Hopkins, 1996), which outline the differences in writing scores between the experimental and control groups, will now be discussed in order to shed greater light on the effectiveness of including cross-curricular (i.e., science) learning opportunities within the literacy block.

The Influence of Science and Literacy Connections on Students' Writing Performance

The results of the independent samples *t*-tests (Glass & Hopkins, 1996), based on the teacher-researcher's scores for all students' posttest compositions, only revealed highly significant results for the persuasive + sentence fluency ($t = -3.64, p < .01$) writing composition. These highly significant results favoured the performance of the experimental group ($M = 17.33$ out of a possible 24) over the control group ($M = 13.90$ out of a possible 24) on this writing task. Both grade 3 classes received various opportunities to study the science-based elements integrated within each writing unit, including the persuasive + sentence fluency unit in which the science focus was on "Soils in the Environment" (Ministry of Education of Ontario, 2007). The students in both the experimental and control groups spent a considerable amount of time studying such science concepts as different types of soil, how earthworms contribute to the health of soil, and composting as a means of creating nutrient-rich soil. The composting theme was, in fact, the topic upon which students focused for the persuasive + sentence fluency posttest. However, students in the experimental group also received numerous opportunities to further learn about soil and composting within their daily literacy block. For example, as part of a listening centre, the experimental students were asked to listen

to and read along with a text entitled “Diary of a Worm” (Cronin, 2003). They were then asked to consider information presented in this text about earthworms and to respond to the following question: “Why might a worm’s life be a dangerous one? Use information from the text and your own ideas in your answer.” As part of a word study centre, the experimental students were given 12 index cards featuring vocabulary words related to soil. Students were asked to sort these words into alphabetical order and to then research the meanings of five of these words that might have been unfamiliar to them. Both of these literacy centres would have provided students in the experimental group with significant, additional knowledge of soil, earthworms, and composting. *The Ontario Curriculum, Grades 1-8: Science and Technology* document (Ministry of Education of Ontario, 2007) features support for building science and technology concepts into language lessons. According to this document, the language curriculum can and should be connected to all subject areas, including science (Ministry of Education of Ontario, 2007). Moreover, through science and literacy connections, students build upon subject-specific vocabulary and more effectively communicate their learning orally and in writing (Ministry of Education of Ontario, 2007). In sum, the supplementary science and literacy connections received by the experimental students were undoubtedly beneficial to students’ knowledge of key words and concepts to be included within their writing.

The results of the independent samples *t*-tests (Glass & Hopkins, 1996) for the teacher-participant’s scores of all students’ posttest compositions only revealed highly significant results for the procedure + word choice writing composition. These significant results favoured the performance of the experimental group over the control group on this writing task. The additional science instruction that the experimental group received

during their literacy block may once more have been a contributing factor to the experimental students' writing achievement. During the procedure + word choice writing unit, the experimental students engaged in learning about the science topic "Strong and Stable Structures" (Ministry of Education of Ontario, 2007). Focused literacy centres on this science topic were incorporated into the experimental group's daily literacy block. For example, the experimental students engaged in a reading centre where they read an informational article from the *Nelson Language Arts: Hand In Hand* (Bogusat et al., 1999) basal reader series entitled, "The Terrific Triangle," and then followed instructions to build a series of triangular structures using plastic straws. As part of a science-based word study centre, students were asked to compose several key words using foam letters (e.g., words such as *structure*, *strength*, *stability*, *force*, *balance*, *position*, *shape*, *form*, *function*, and *load*). Once students had formed these words, they were asked to locate the definitions of four of these words in the dictionary and to then use their knowledge of word choice to create an interesting sentence using each of their chosen words. Hapgood and Palincsar (2007) maintain that reading and writing about specific science topics assists students in acquiring literacy strategies at a greater rate than through direct instruction. Accordingly, the experimental students were highly engaged throughout these science-based literacy centres, as observed by the teacher-researcher, and this likely impacted on the quality of students' posttest procedure + word choice compositions. There are, however, other underlying elements that may have contributed to the experimental group's higher procedure + word choice scores. It was noted in the second interview with the teacher-participant that she may have exhibited some bias towards the students in the experimental group. The teacher-participant stated that she felt the

students in the experimental group were likely more adept as writers and possessed greater proficiency in utilizing the rubrics for self-assessment purposes than her students. The teacher-participant expressed her views of the two grade 3 classes during her second interview, which took place at the same point that students were being introduced to the procedure + word choice writing unit. These biases may have, therefore, unintentionally influenced the teacher-participant in her assessments of the procedure + word choice compositions. The teacher-participant also indicated that as the school year progressed, her students had grown tired of the writing units, and showed little interest for both the writing topics and the self-assessment process. In contrast, the teacher-researcher noted that the experimental group continued to take the process of self-assessing their work very seriously.

As it appears that additional cross-curricular science connections within the literacy block assisted the experimental students in producing higher-quality persuasive + sentence fluency compositions (based on the teacher-researcher's scores), and higher quality procedure + word choice pieces (based on the teacher-participant's scores), why then do the remaining writing units show no significant differences between the two grade 3 classes? The students in both the experimental and the control groups were combined for all introductory lessons on the specific forms and traits of writing, and the teacher-researcher was responsible for conducting each of these lessons (as described in Chapter Three). As such, both grade 3 classes received the same instruction for all initial forms and traits writing lessons and, therefore, benefited from the same writing instruction. The teacher-researcher then provided the teacher-participant with the lesson plans, writing exemplars, writing rubrics, and reflection prompts to present to the control

group throughout the duration of each writing unit. Students in both classes also received the same number of individual science lessons featuring experiments and hands-on activities, and these were planned collaboratively between the teacher-researcher and the teacher-participant. It is worth recalling that for the results of the pre- and postscience assessments, students in both the experimental and control groups possessed the same science content knowledge prior to, and at the completion of each unit.

In light of the fact that the teacher-researcher and the teacher-participant had strong interrater reliability, it is noteworthy that these teachers scored differently on the persuasive + sentence fluency and procedure + word choice compositions. The quantitative data indicate that the teacher-researcher was more generous in her scoring of the experimental group's persuasive + sentence fluency pieces than the teacher-participant. One explanation for this discrepancy in scoring is that the teacher-researcher may have been more adept at interpreting and applying the information within the persuasive + sentence fluency rubric than the teacher-participant. Given that the teacher-researcher was responsible for the development of the teacher-created rubrics, she may have had an advantage in utilizing these rubrics for the assessment of students writing. The teacher-researcher also had experience using these same teacher-created rubrics when assessing the writing of her grades 2 and 3 students during previous academic years (i.e., 2006/2007 and 2007/2008). However, the teacher-participant had no previous experience using the teacher-created rubrics, and may have faced some difficulty in interpreting the criteria within the persuasive + sentence fluency rubric in a reliable manner. On the other hand, the teacher-participant was more generous in her scoring of the experimental group's procedure + word choice compositions than the teacher-

researcher. This may be attributed to the fact that the procedure + word choice unit was the final writing unit in this study, and it was at this time that the teacher-participant admitted during her final interview that she felt the experimental students were stronger writers than the students in the control group. This bias may have contributed to the teacher-participant's higher scores on the experimental group's procedure + word choice compositions.

A further reason for the lack of significant differences between the experimental and control groups may be that both teachers faced considerable time constraints throughout the school year during which this study took place. These time constraints, as noted in the qualitative data, were also a factor in the amount of science instruction that both groups of students received as this study progressed. Due to the fact that the grade 3 EQAO test was to be written at the end of May/2009, the instructional foci in the two grade 3 classrooms shifted. Reading strategies, such as how to effectively answer open response and multiple choice questions, as well as specific numeracy concepts, became the major focus of daily instruction. Thus, both teachers designated less time for focused science instruction on the topics of "Forces and Movement" and "Strong and Stable Structures," and were able to devote less time to writing lessons. This may likely have had an impact on students' writing performance. Kern, Andre, Schilke, Barton, and Conn-McGuire (2003) believe that making enough time for writing instruction is extremely challenging for educators. According to Kern et al. (2003), it is also difficult for teachers to design an effective writing curriculum with a clear sense of continuity. For this reason, students may not have exhibited the anticipated differences that one would have expected to see between the experimental and control groups.

The evidence presented in this section points to the fact that additional cross-curricular learning opportunities, which involved a link between science and language concepts, assisted the experimental group in producing certain higher-level compositions (i.e., persuasive + sentence fluency and procedure + word choice) than the control group. Although only two of the writing units exhibited significant differences between the grade 3 classes, it remains apparent that any instructional opportunities that provide students with additional learning strategies for writing should be incorporated into one's teaching practice.

Student Self-Assessments of Integrated Writing Compositions

Grade 3 students in both the experimental and control groups were given numerous opportunities to self-assess their written work using a series of writing rubrics throughout this study. One of the central goals of this research was to determine whether or not students could reliably self-assess their written compositions using student-generated and/or teacher-created writing rubrics. It appears that students in the experimental group were accurate in self-assessing their written compositions, as the experimental group's scores demonstrated significant correlations with the teacher-researcher's scores on the recount + ideas, report + organization, and persuasive + sentence fluency rough drafts, as well as the recount + ideas, report + organization, and procedural + word choice good copies. The teacher-researcher noted in her reflections that students in the experimental group appeared continually engaged in the self-assessment process. These students often sought the teacher-researcher's input as to whether or not they were scoring themselves in a fair and appropriate manner. This would indicate that the experimental students took the self-assessment process seriously,

and were determined to apply self-assessment strategies to help them refine their written work.

Based on the findings of this study, the experimental students effectively used the student-developed writing rubrics in two ways: first, to formatively assess the rough drafts of their written work, and secondly, to score the good copies of their writing in a summative manner. The experimental students benefited from the use of their own writing assessment tools as they used the student-generated rubrics to formatively assess their rough work. The use of formative assessment ultimately helped to guide the experimental group in making necessary revisions to their writing. During the formative assessment process, students are involved in making connections to their existing knowledge base and in analyzing their learning, which, in turn, assists students in improving the quality of their writing (Earl, 2003). As students are encouraged to formatively assess the progress of their work, they may also exhibit gains in their self-confidence and motivation levels (Santrock, Woloshyn, Gallagher, DiPetta, & Marini, 2010). The student interviews and reflections indicate that the experimental students did, in fact, display greater confidence in their abilities to apply self-assessment strategies in their writing, and also demonstrated considerable motivation to employ the writing tools they had cooperatively developed.

Interestingly, neither the rough drafts nor the good copies of the experimental group's narrative + voice compositions showed any significant correlations. As evidenced in the qualitative findings, the experimental students exhibited considerable self-efficacy with respect to their narrative + voice writing performance, as they thoroughly enjoyed creating the narrative compositions. It appears that the teacher-

researcher took a more critical stance in her scoring of the narrative pieces than her students, as it was apparent to the teacher-researcher that several students in fact struggled not only with the concept of narrative writing but with the trait of voice. However, on the whole, the experimental group was, in fact, highly successful in applying the student-generated rubrics to self-assess their writing.

Interestingly, although overall the grade 3 students in the experimental group were extremely effective self-assessors of their written work, this contradicts much of the existing research on student self-assessment practices (e.g., Blatchford, 1997; Butler, 1990; Ross, 2006). According to Ross, students in the primary grades often overrate themselves on self-assessments, as younger students have not yet developed the cognitive skills to effectively assimilate information about their abilities, and may possess false impressions of the quality of their work. This was, however, not the case with the students in the experimental group, as their writing self-assessments exemplified high correlations with the teacher-researcher's assessments of their written work, indicating that the experimental students were fully capable of accurately assessing their own writing compositions. Ross, Rolheiser, and Hogaboam-Gray (1999) posit that students' tendencies to inflate their scores decreased when teachers shared assessment responsibilities with their students. These shared responsibilities include teaching students how to effectively use assessment tools to score their own work, as well as collaboratively developing assessment tools with students. The conclusions of Ross et al. (1999) support the findings of this study that the experimental students, having been thoroughly involved in the development and proper use of the writing rubrics, were effective self-assessors of their work. On the other hand, the control students did not meet

with the same level of success in utilizing the writing rubrics for the self-assessment of their written work.

Measures of the control group's posttest writing assessments, based on the teacher-researcher's and teacher-participant's scores, identified only one writing unit with a significant correlation: the procedure + word choice compositions. This may be attributed to the fact that the procedure + word choice compositions were the final pieces of writing that both the students and teachers assessed. The significant correlation on the procedure + word choice writing task may also be attributed to the fact that students had the opportunity to engage in a compelling, hands-on activity as part of this writing unit, whereby the students were asked to build a strong and stable structure of their choice. Students' interest and motivation in building their own structure may have, in fact, contributed to their effectiveness in self-assessing and revising their work on the procedure + word choice piece. However, apart from the procedure + word choice compositions, comparisons among the control group's posttest writing assessments with the teacher-researcher's and teacher-participant's scores showed few significant correlations. This lack of correlation suggests that the control students were not nearly as skilled as the teachers in utilizing rubrics as assessment tools. A close examination of the results seems to indicate that the control students either struggled in their use of the teacher-created writing rubrics, or they had little interest in using these assessment tools to evaluate their work. A number of students in the control group commented within their reflections and during the interviews that they did not understand the purpose of self-assessment, nor did they have any desire to utilize the writing rubrics to revise and edit their written work. The teacher-participant also indicated that she did not devote a great

deal of time to deconstructing the teacher-created rubrics with the students in her class, as she did not initially see the value in having students utilize these rubrics for the purposes of revising, editing, and essentially self-assessing their work.

In general, both the quantitative and qualitative results of this study suggest that there is greater value in involving students in the rubric development process than in asking students to utilize precreated rubrics to self-assess their writing. Ultimately involving students in the development of their own assessment tools may help to increase students' engagement and success in self-assessing their work.

Implications for Practice

Writing is a highly sophisticated task that involves generative thought processes that must be sensitive to the needs and expectations of an audience. To communicate effectively, writers must achieve focus, clarity, and coherence using a suitable style, a meaningful organizational plan, and appropriate conventions (Henk et al., 2004). In addition, skilled writers require facility with a wide range of forms and accompanying purposes (Henk et al., 2004). It is for these reasons that a multifaceted, combined-approach to writing instruction is necessary in providing students with the proper tools to become effective writers.

Existing research has shown that elementary school students, particularly in the primary grades, have difficulty developing and mastering effective writing skills (Calkins, 1994; Clay, 1975; Culham, 2005; EQAO, 2010; Ministry of Education of Ontario, 2005a; Stead, 2002; Tompkins, 2000). Yet, it is only throughout the past 3 decades that educational researchers have directed their focus towards studying what students actually do when engaged in writing, and what teachers can do to support and

enhance the writing development of their students. The educational reform movement of the 1990s placed a great deal of attention on students' language development and the need for rigorous standards and clear descriptions of what it means to be a proficient writer (Strickland et al., 2001). Consequently, there has been a resurgence of interest in models of writing instruction and assessment that clearly define the components of good writing. Yet, there remains a lack of rigorous empirical research around effective approaches to writing instruction and assessment. Classroom teachers often provide testimonials and unsolicited data with respect to the efficacy of various writing models, but there are little research data to support the effectiveness of form-specific and trait-based writing programs. There is also little empirical research outlining the development and use of writing assessment tools with primary students. It is hoped that this study will add to existing writing research, to assist practitioners and researchers in employing sound writing instruction and assessment techniques within their respective fields.

The findings of this study suggest an approach to writing that integrates specific writing traits within various written forms helps to enhance students' understandings of writing concepts. These research findings also indicate that the incorporation of science concepts within writing lessons, as well as the literacy block as a whole, leads to improvements in students' written compositions. The use of student-generated writing rubrics with grade 3 students was also crucial in facilitating the drafting, revising, editing, and publishing of students' written work. In short, students learned to use writing rubrics not only in a formative manner, but in a summative manner, to help improve the quality of their writing. These findings have several implications for instructional and assessment practices among educators and students.

One of the most common concerns of Canadian and American educators is that there is a lack of time to successfully implement all of the expectations within the various provincial, territorial, or state curricula during an academic year (Compton, 2002; Drake & Burns, 2004; Harvey & Reid, 2001). As such, an integrated program should be created within classrooms, whereby teachers make cross-curricular connections within their instruction among specific subjects and strands. Additionally, teachers are rarely provided with significant amounts of time to meet with their divisional teams so that they might collaboratively develop and implement effective instructional and assessment procedures. If teachers were allotted a portion of an instructional day once per week to meet as a division, this time could be spent creating effective writing instructional strategies, as well as sound pedagogy that involves an integrated approach to teaching and learning. Once the divisional team of teachers had collaboratively developed a series of instructional and assessment strategies, each teacher could implement these strategies within their respective classrooms, and could then report back to their divisional team as to the efficacy of this technique. Teachers could also use a portion of time during each divisional and/or school-wide meeting to discuss the development and implementation of writing rubrics in their classrooms. Teachers could then participate in moderated marking sessions to determine the usability and validity of any rubrics that were being used in classrooms. During moderated marking sessions, teachers collaboratively examine student work, based on predetermined assessment criteria (Hastings and Prince Edward District School Board, 2009). Moderated marking sessions would not only be beneficial in developing and examining valid assessment tools, but would also help to build upon teachers' interrater reliability among one another.

As educational practitioners, the findings of this study indicate that we need to hone our critical skills when it comes to designing and implementing writing lessons and assessments. One of the ways in which educators can become more critical of their practice is through the incorporation of professional learning communities within divisions, schools, and school boards. A professional learning community (PLC) consists of a group of educators who plan and implement instructional strategies on a collaborative level, in order to improve student performance (Hord, 1997). Dufour (2004) notes that professional learning communities should not only focus on teaching students, but on ensuring that students actually learn. In order to ensure that student learning takes place, it is crucial that educators work collaboratively not only to create effective plans for an integrated writing instruction program, but to remain consistent in the development and use of writing assessment tools. In order to accomplish these goals, teachers could initially gather at the beginning of the school year to develop a writing program that melds specific forms and traits of writing within other curricular areas (i.e., science, social studies, mathematics, health). Teachers could then meet on a weekly basis, as part of their PLC, to discuss the successes and challenges of their integrated writing program. According to DuFour (2004), when teachers work together to analyze and improve their classroom practice, this collaborative process leads to increased student achievement and learning. However, not only is it necessary for teachers to collectively reflect upon their writing instruction, but to consider effective writing assessment strategies within the classroom.

The results of this study hold implications for practitioners in terms of sound writing instruction, as well as effective assessment of students' writing. These research

findings indicate that not only should students be afforded opportunities to utilize writing rubrics for the self-assessment of their work, but they should be active participants in the development of these rubrics. According to Zimmerman and Risemberg (1997), primary-aged writers seldom make appropriate revisions to the rough drafts of their writing pieces, and rarely monitor their final writing products to ensure that they have achieved their writing goals. Both the findings of this study and those of Zimmerman and Risemberg (1997) suggest that students should be given opportunities to utilize writing assessment tools (i.e., rubrics) to both formatively and summatively assess their written work. In order to encourage teachers to create and employ writing rubrics with their students, exemplars of student-generated rubrics could be given to teachers to examine during a PLC session. A discussion could then ensue around the criteria and descriptors within these sample rubrics. By providing teachers with samples of authentic writing assessment tools, this may help them to become familiar with the process of creating and utilizing writing rubrics with their students. Teachers could then refer to the criteria within the exemplar rubrics to assist students in creating their own unique writing rubrics.

Once teachers and students have gained an understanding of the process of collaboratively developing writing rubrics, these rubrics could be used as formative assessment tools to enhance students' understandings of the writing process. Formative assessment is specifically intended to provide feedback on students' academic performance, in order to enhance their learning experiences (Black & Wiliam, 1998; Sadler, 1998). In this study, all grade 3 students (particularly those students in the experimental group) benefited from immediate feedback when using the writing rubrics as formative assessment tools. When providing students with evaluative tools to self-

assess their writing, it is crucial that these tools not only be used for the purposes of summative evaluation, but to formatively assess students' written compositions. This aligns with Andrade's (2009) views on assessment practices, that self-assessment is, in fact, a process of formative assessment during which students reflect upon their written work, judge the degree to which they have achieved explicitly stated criteria within their written compositions, and revise their writing rough drafts accordingly.

This study was conducted with two groups of grade 3 students, who due to their young age, required considerable prompting and guidance in the development of the writing rubrics. In general, primary-aged students would face significant challenges in creating writing rubrics without teacher assistance. However, students in the junior (grades 4-6) and intermediate (grades 7-8) divisions, as well as secondary school students, may experience greater ease in developing writing assessment tools independent of the teacher. As such, older students could be given opportunities to access online rubric-creation programs, such as The Rubric Builder (2006) while working in peer groups, to develop specific student-generated writing rubrics. These older students could then discuss and share their rubrics with the remainder of the class, in order to analyze and critique these assessment tools.

Clearly, students of all ages should be afforded opportunities to view and apply authentic writing assessment tools in the classroom. However, an additional implication for practice would be to look beyond individual classrooms, and to create a partnership among the teacher, the students, and the parents. Existing research indicates that when parents are actively involved in the literacy learning of their children, these children tend to show improvements in academic performance (Benson & Martin, 2003; Risko &

Walker-Dalhouse, 2009). Therefore, teachers could initially send student-developed writing rubrics home to be shared with parents. Students could then bring specific pieces of writing home, so that parents and children could work together to self-assess these compositions using the student-generated rubrics. Finally, parents and children could collaboratively complete a written reflection based on the writing self-assessment process. It is hoped that providing parents with opportunities to become actively involved in the literacy experiences of their children would help to build upon parents' awareness of the instructional and assessment strategies that take place in the classroom, leading to a better understanding of the curriculum and the provincial report card.

Overall, the findings from this study have shown that educational practitioners and students alike can reap the benefits of an integrated approach to writing instruction. In merging specific traits of writing within different forms of writing, while also incorporating elements of the science curriculum within writing lessons, teachers are provided with additional time to meet all of the expectations of the Ontario curriculum. Students also benefit from a combined approach to writing instruction, as the act of writing takes on greater meaning for students in allowing them to make real-world connections within their compositions. In turn, students are able to improve their writing performance. Finally, in having students and teachers work collaboratively to develop writing rubrics, students gain ownership for the assessment of their writing. Students are then able to apply formative and summative assessment strategies to revise their work and, in turn, produce higher-level written compositions.

Implications for Theory

This research study was supported by a constructivist theoretical approach to

learning, with a focus on building students' knowledge and application of various forms and traits of writing. The theory of experiential learning (Kolb, 1984) was also used as a theoretical framework for this study, as students were given opportunities to facilitate their own learning through the processes of self-assessment and reflection. Several recommendations are provided to assist teachers in adopting constructivist and experiential learning approaches within their writing programs.

In this study, grade 3 students were provided with authentic, integrated writing opportunities that were embedded within the Ontario science curriculum. A constructivist theoretical model was incorporated into writing activities, as each writing unit was purposefully linked to the science curriculum, allowing students to make "real-world" connections as they composed their written pieces. According to Dewey, in a constructivist classroom environment, students should engage in intentional actions that have specific goals and allow students to make observations and draw conclusions based on these actions (as cited in Sutinen, 2008). As such, the grade 3 students involved in this study received writing instruction that was not only purposeful but allowed them to draw upon their personal experiences to create authentic pieces of writing. During the integrated unit that combined recount writing, the trait of ideas, and science concepts on "Growth and Changes in Plants" (Ministry of Education of Ontario, 2007), the grade 3 students participated in a nature walk around the school yard. During this nature walk, students were asked to make observations on the surrounding plant life, to collect items (such as various plant parts) in order to create a nature collage, and to then write about the day's experiences. The nature walk and accompanying art and writing tasks connected the science, visual arts, and writing curricula, providing students with

authenticity and purpose to their writing. Dewey believed that each learning experience should leave students with an increased sense of motivation and a desire to engage in problem solving related to the topic of study (as cited in Henson, 2003). As such, had students been asked to write on a recount prompt that was unrelated to other areas of the curriculum, this writing task may have held little meaning for students, potentially lowering students' motivation to create higher-level pieces of writing. However, providing the grade 3 students with authentic, purposeful writing opportunities led to improvements in their writing performance from pretest to posttest.

A second example of a constructivist approach to writing instruction within this study occurred when students were involved in the development and use of a classroom composter as part of the persuasive writing and sentence fluency unit, which also incorporated expectations from the grade 3 science strand on "Soils in the Environment" (Ministry of Education of Ontario, 2007). The final writing task that accompanied this unit had students composing a persuasive piece of writing on whether or not it is important to adopt a composting program in the home and at school. A constructivist classroom setting is created when students are asked to write about topics that hold significance for them not only in the classroom, but outside of the school walls. Students reap the benefits of an integrated curriculum when educators make cross-curricular connections between literacy and a range of subject areas (i.e., science, social studies, math), as these connections help to provide greater purpose for students' written tasks, leading to improvements in their writing performance. It should be noted that the constructivist methods which framed this study are not only applicable to a grade 3 writing program, but can be adopted within any classroom, at any grade level. Educators

need only develop familiarity with the curriculum at a given grade level to identify appropriate cross-curricular connections that would provide students with authentic writing opportunities (Drake & Burns, 2004).

Once students engaged in the writing process following each of the integrated writing units, they were given opportunities to self-assess the rough drafts and subsequent good copies of their written work. Throughout this study, self-assessment and reflection strategies were viewed through the lens of Kolb's (1984) theory of experiential learning. In his theory, Kolb (1984) posits that students progress through four stages of learning that involve concrete experience (doing), reflective observation (observing), abstract conceptualization (thinking), and active experimentation (planning). These stages of experiential learning are analogous with the grade 3 students' experiences in composing and self-assessing their writing. First of all, as students engaged in the drafting stage of their writing, they were involved in the first stage of experiential learning; that of concrete experience (Kolb, 1984). Secondly, students utilized their respective writing rubrics to consider their rough drafts and to self-assess these pieces, indicating that students were involved in reflective observation (Kolb, 1984). Once the self-assessments of their rough drafts were complete, it was necessary for students to revise and edit these drafts in order to make improvements to their written work. As such, students were engaged in abstract conceptualization (Kolb, 1984) of their work. Finally, students used active experimentation (Kolb, 1984) to complete a final, published copy of their writing and to re-assess these good copies.

Although both constructivist and experiential learning frameworks formed the theoretical basis for this study, these theories were present at different levels in the two

participating grade 3 classrooms. In the teacher-researcher's classroom, the grade 3 experimental students were highly involved in the learning and assessment processes of the writing and science curricula. Splitter (2009) notes that when students understand that their views are relevant to the ongoing construction of knowledge within a given subject area, then they are more likely to view themselves as active participants in their learning. As such, students become engaged learners, and not simply passive recipients of curricular knowledge (Splitter, 2009). The experimental students were, in fact, active participants in the development of the writing rubrics, and were fully engaged in the writing, self-assessment, and reflection activities within this study.

On the other hand, the findings of this study revealed that the control group was less involved than the experimental group in the construction of knowledge throughout writing instruction and assessment activities. In effect, the control students were not afforded opportunities to generate the writing rubrics that they used for the self-assessment of their written work. According to Sutinen (2008), "when students are involved in genuine, discipline-based construction, their work is bound to be more meaningful to them" (p. 9). Unfortunately, the control students were not involved in the construction of the writing rubrics, and, therefore, found little meaning in the use of these rubrics. In turn, the control students had less interest and motivation than the experimental students to create higher-level written compositions. The teacher-participant's initial concerns surrounding the challenges that primary students may face when self-assessing their writing could have, in fact, impacted on the control students' attitudes towards utilizing the teacher-created writing rubrics as formative and summative assessment tools. However, the teacher-participant began to adopt a constructivist view

of learning as this study progressed, as she noted the positive attitude of the experimental students towards developing and applying writing assessment tools to improve their written compositions. Powell and Kalina (2009) feel that the next important step in educational reform is to encourage more teachers to adopt constructivist teaching strategies and practices in their classrooms. Constructivist teaching strategies have a great effect in the classroom both cognitively and socially for the student. Piaget and Vygotsky believed that teachers should act as facilitators of student learning, allowing students to construct, organize, and reorganize their knowledge as they are presented with information (as cited in Powell & Kalina, 2009). If students are to become independent, successful writers, then it is essential that they be given opportunities at a young age to work and learn in a constructivist classroom environment.

Implications for Future Research

This mixed-methods study was designed to gain a deeper understanding of a combined approach to writing instruction through the merging of specific forms and traits of writing within topics from the grade 3 Ontario science curriculum. An examination of writing assessment practices was also an integral part of this research. Although the current results of this study are encouraging, several implications for further research in the areas of writing instruction and assessment are recommended.

This current study featured a mixed-methods design, involving the collection of both qualitative and quantitative data. However, an alternative design might be of interest to educational practitioners or researchers who wish to replicate this study. It may be of interest to follow a design that is strictly qualitative in nature, in order to interview numerous students involved in specific writing and assessment tasks. This could lead to

greater insight from students on their perceptions of integrated writing instruction and self-assessment.

The results of this investigation suggest that the integration of particular forms and traits of writing with science content was effective in improving grade 3 students' writing performance. Therefore, further research could examine the effectiveness of an integrated program with students in other grade levels (i.e., grades 1-2; grades 4-12). This study could also be conducted with an integrated focus on an area of the curriculum other than science (i.e., social studies, math, health). Additionally, rather than having one focused unit on narrative writing throughout a writing study, students could be given opportunities to compose an expository and a narrative piece in connection to each of the strands of a given curricular area. This would provide a larger array of rich data surrounding student achievement in both expository and narrative forms of writing.

A longitudinal study that followed the same group of participants into the later grades could offer greater insight into students' writing development and achievement across time. First of all, it might be worthwhile to more closely examine the impact of an integrated writing program, as well as the use of student-developed writing rubrics, on grade 3 students' EQAO writing results. The writing scores of this same group of students could then be examined 3 years later, once they have written the grade 6 EQAO test. These findings might indicate whether or not sustained exposure to an integrated writing program, as well as repeated self-assessment opportunities, prove to have a greater impact on students' writing performance and achievement.

Future research could also involve using pre- and posttest writing prompts that are more closely linked in their specificity, as the posttest writing prompts provided to

students in this study were much more specific and perhaps leading in their nature, while the pretest writing prompts were open to greater interpretation by the students. A second possibility would be to have students compose their writing using pre- and posttest prompts that are connected to the same subject matter being integrated within specific writing units. In other words, all the prompts could be science-based, or any other subject area that might be a focus during each integrated writing unit.

A future research endeavour might also involve examining either a) the use of student-generated writing assessment tools with one group versus the provision of teacher-created writing rubrics with another group, while providing both groups with science instruction that is integrated within the literacy block, or b) the use of teacher-created writing rubrics with two groups, while providing only one of these groups with science instruction that is integrated within the literacy block. Based on the findings of this study, it may be difficult to pinpoint whether it was the use of the student-generated rubrics or the implementation of additional science instructional opportunities within the literacy block that led to an increase in writing performance among the students in the experimental group. Therefore by eliminating one of these criteria in future research, these future findings could provide educational researchers and educators with greater insights into effective writing instruction and assessment.

The reflection process was used by students and teachers throughout this study to glean important qualitative findings and conclusions. However, this process could, undoubtedly, be refined, providing students with a greater number of possible prompts to which they might respond. Students could also be given opportunities to respond to writing instruction and assessment in a more open-ended manner. This would entail

asking students to record their thoughts in a reflection journal, in order to capture any and all student views on an integrated approach to writing and self-assessment.

Parental involvement was not considered in this research and in the future may provide an interesting perspective with respect to students' writing compositions and the self-assessment process. It would be beneficial to know how parents view the impact of an integrated writing program on their children's achievement in writing, as well as the advantages or disadvantages they perceive their children to be experiencing as a result of an integrated writing instruction and assessment program.

There is currently very little empirical research on the traits of writing. As such, in this researcher's opinion, it is integral that further focus and study be given to the six writing traits and their impact on elementary and secondary students' writing performance. One research possibility would be to examine the traits of writing on a school-wide level. An integrated writing program merging specific traits and forms of writing could be developed by grades 1-8 teachers in a given elementary school. The school's literacy coach could then conduct these integrated writing lessons within each classroom, and students' writing performance could subsequently be recorded. These writing results could then be compared to students within other schools who are not receiving integrated writing lessons, or any trait-based writing instruction whatsoever. A second possibility in expanding upon trait-based writing research might be to replicate this current study, but to assess the trait-based elements of students' writing in a cumulative fashion, so that by the end of the study the students' compositions are being assessed based on all of the traits of writing.

Conclusion

Writing instruction and assessment are vast and complex topics. Unfortunately, there are few studies that have examined the integration of specific traits and forms of writing on student's writing performance or the effects of rubric development and writing self-assessment among primary students. MacArthur et al. (2006) feel there is a definite need for research in writing instruction "that supports children's successful growth in written communications" (p. 140).

A substantive number of Ontario students are currently achieving below the provincial standard in the area of writing (EQAO, 2010). While there is some debate as to the number of students who experience difficulties in writing, data collected in recent years have pointed to a significant problem in writing development among children. It is clear that educators now need to extend their focus of writing instruction to deliver all possible facets of written language to students. Therefore, combined approaches to writing instruction and assessment should be utilized in classrooms, with a clear focus on the forms and traits of writing.

This study has shown that an integrated writing curriculum, which connected specific written forms, writing traits, and science concepts, had a positive impact on grade 3 students' writing performance. Through the use of teacher-created and student-generated assessment tools, grade 3 students were able to create higher-quality written compositions from pretest to posttest. Of particular interest is the fact that the grade 3 students who employed the student-generated writing rubrics to assess their writing displayed greater intrinsic motivation for all writing and assessment tasks.

In conclusion, the need for change in writing instruction and assessment practices is evident. It is hoped that this research helps to highlight the importance of quality writing instruction and assessment, and the continued need for further research in the area of primary students' writing development.

References

- Aiken, L. R. (2000). *Psychological testing and assessment*. Boston: Allyn & Bacon.
- Airasian, P. W., Engemann, J. F., & Gallagher, T. L. (2007). *Classroom assessment: Concepts and applications—First Canadian Edition*. Toronto, Canada: McGraw-Hill.
- Andrade, H. (2001). The effects of instructional rubrics on learning to write. *Current Issues in Education*, 4(4). Retrieved, March 25, 2010 from <http://cie.ed.asu.edu/volume4/number4>
- Andrade, H. (2008). Self-assessment through rubrics. *Educational Leadership*, 65(4), 60-63.
- Andrade, H. (2009). Promoting learning and achievement through self-assessment. *Theory into Practice*, 48(1), 12-19.
- Andrade, H., Du, Y., & Wang, X. (2008). Putting rubrics to the test: The effect of a model, criteria generation, and rubric-referenced self-assessment on elementary students' writing. *Educational Measurement Issues & Practice*, 27(2), 3-13.
- Auger, W., & Wideman, R. (2000). Using action research to open the door to life-long professional learning. *Education*, 12(1), 120-127.
- Banks, S. (2005). *Classroom assessment – Issues and practices*. Boston: Pearson Education.
- Beal C., Grable, L., & Robertson, A. (2001). Adolescent development: Applied theorists. *Curriculum Integration*. Retrieved August 19, 2008, from <http://www.ncsu.edu/chass/extension/ci/applied.html>

- Benson, F., & Martin, S. (2003). Organizing successful parent involvement in urban schools. *Child Study Journal*, 33, 187-193.
- Benson, V., & Cummins, C. (2000). *The power of retelling: Developmental steps for building comprehension*. Chicago: Wright Group McGraw-Hill.
- Bingham, G., Holbrook, T., & Meyers, L. E. (2010). Using self-assessment in elementary classrooms. *Phi Delta Kappan*, 91(5), 59-61.
- Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2004). Working inside the black box: Assessment for learning in the classroom. *Phi Delta Kappan*, 86(1), 9-21.
- Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 80(2), 139-148.
- Blatchford, P. (1997). Students' self-assessments of academic attainment: Accuracy and stability from 7-16 years and influence of domain and social comparison group. *Educational Psychology*, 17(3), 345-360.
- Bogusat, C., Dockendorf, M., Eklund, B., Finochio, C., Jeroski, S., & McCarthy, M. (1999). *Nelson language arts: Hand in hand*. Toronto, Canada: International Thompson.
- Boody, R. M. (2008) Teacher reflection as teacher change, and teacher change as moral response. *Education*, 128(3), 498-506.
- Brookhart, S. M., Andolina, M., Zuza, M., & Furman, R. (2004) Minute math: An action research study of student self-assessment. *Educational Studies in Mathematics*, 57(2), 213-227.

- Butler, R. (1990). The effects of mastery and competitive conditions on self-assessment at different ages. *Child Development*, 61, 201-210.
- Calhoun, E. F. (2002). Action research for school improvement. *Educational Leadership*, 59(6), 18-24.
- Calkins, L. M. (1986). *The art of teaching writing*. Portsmouth, NH: Heinemann.
- Calkins, L. M. (1994). *The art of teaching writing* (2nd ed.). Portsmouth, NH: Heinemann.
- Carr, D. (2007). Towards an educationally meaningful curriculum: Epistemic holism and knowledge integration revisited. *British Journal of Educational Studies*, 55(1), 3-20.
- Chapman, M. (1995). The sociocognitive construction of written genres in first grade. *Research in the Teaching of English*, 29, 164-192.
- Chapman, M. (2002). A longitudinal case study of curriculum genres, K-3. *Canadian Journal of Education*, 27, 21-44.
- Clay, M. (1975). *What did I write? Beginning writing behaviour*. Auckland, New Zealand: Heinemann.
- Compton, R. (2002). Discovering the promise of curriculum integration: The national curriculum integration project. *Conflict Resolution Quarterly*, 19(4), 447-464.
- Coyle K. K., Russell L. A., Shields J. P., & Tanaka, B. A. (2007). *Summary report: Collecting data from children ages 9-13*. Retrieved September 30, 2009, from <http://www.lpfch.org/informed/facts/etrsummaryreport.pdf>
- Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson.
- Cronin, D. (2003). *Diary of a worm*. New York: HarperCollins.

- Culham, R. (2003). *6 + 1 traits of writing: The complete guide grades 3 and up*. New York: Scholastic.
- Culham, R. (2005). *6 + 1 traits of writing: The complete guide for the primary grades*. New York: Scholastic.
- Culham, R. (2006). The trait lady speaks up. *Educational Leadership*, 64(2), 53-57.
- Culham, R., & Coutu, R. (2008). *Using picture books to teach writing with the traits K-2*. New York: Scholastic.
- Davis, E. (2000). Scaffolding students' knowledge integration: Prompts for reflection in KIE. *International Journal of Science Education*, 22(8), 819-837.
- DeFoe, M. C. (2000). *Using directed writing strategies to teach students writing skills in middle grades language arts*. Fort Lauderdale: Nova Southeastern University. (ERIC Document Reproduction Service No.ED444186).
- Donovan, C. (2001). Children's development and control of written story and informational genres: Insights from one elementary school. *Research in the Teaching of English*, 35, 394-447.
- Dorn, L. J., & Soffos, C. (2001). *Scaffolding young writers: A writers' workshop approach*. Portland, ME: Stenhouse.
- Drake, S. M., & Burns R. C. (2004). *Meeting standards through integrated curriculum*. Alexandria, VA: Association for Curriculum and Supervision Development.
- DuFour, R. (2004). What is a professional learning community? *Educational Leadership*, 61(8), 6-11.
- Dunsmuir, S., & Blatchford, P. (2004). Predictors of writing competence in 4- to 7-year-old children. *British Journal of Educational Psychology*, 74(3), 461-483.

- Dyson, A. H. (1988). Negotiating among multiple words: The space/time dimensions of young children's composing. *Research in the Teaching of English*, 22(4), 355-391.
- Earl, L. (2003). *Assessment as learning: Using classroom assessment to maximize student learning*. Thousand Oaks, CA: Corwin Press.
- Education Department of Western Australia. (1997). *First steps writing developmental continuum*. Melbourne, Australia: Addison Wesley Longman.
- Education Encyclopedia. (2008). *Teaching of writing: History, issues and trends in school-based writing instruction, research*. Retrieved July 20, 2008, from <http://education.stateuniversity.com/pages/2552/Writing-Teaching.html>
- Education Quality and Accountability Office. (EQAO). (2010). *EQAO's provincial elementary school report on the results of the 2009/2010 assessments of reading, writing and mathematics, primary division (grades 1-3) and junior division (grades 4-6)*. Retrieved October 2, 2010, from http://www.eqao.com/pdf_e/10/EQAO_ProvincialReport_Elementary2010.pdf
- Farris, P. (2008). Examining and developing writing traits through reading. *Illinois Reading Council Journal*, 36(2), 13-17.
- Fitzgerald, J., & Shanahan, T. (2000). Reading and writing relations and their development. *Educational Psychologist*, 35(1), 39-50.
- Flower, J. R., & Hayes, L. (1981). A cognitive process theory of writing. *College Composition and Communication*, 32, 365-387.

- Gallagher, T. L., Engemann, J. F., & Morawek, A. J. (2007). *An assessment bank for classroom assessment: Concepts and applications – First Canadian Edition*. Toronto, Canada: McGraw-Hill.
- Gambell, T. J. (2001). Teaching writing, genres, and university discourse: Revisiting, rethinking. *Textual Studies in Canada*, 13/14, 171-189.
- Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education and psychology* (3rd ed.). Boston: Allyn and Bacon.
- Goodrich, H. (1997). Understanding rubrics. *Educational Leadership*, 54(4), 14-18.
- Graves, D. H. (1983). *Writing: Teachers and children at work*. Portsmouth, NH: Heinemann.
- Graves, D. H. (1994). *A fresh look at writing*. Portsmouth, NH: Heinemann.
- Gribbin, W. G. (1991). Writing across the curriculum: Assignments and evaluation. *Clearing House*, 64(4), 365-369.
- Hapgood, S., & Palincsar, A. S. (2007). Where literacy and science intersect. *Educational Leadership*, 64(4), 56-60.
- Harvey, C., & Reid, S. (2001). Challenge: How can a faculty of education model integrated curriculum for grades seven to twelve? *Education*, 121(3), 604-607.
- Hastings and Prince Edward District School Board. (2009). Moderated marking: The what, the why, the how. *Literacy Partner*. Retrieved, April 27, 2010 from http://www.hpedsb.on.ca/ec/services/cst/elementary/literacy/documents/Moderated_Marking-Literacy_Partners_Meeting.ppt

- Henk, W. A., Marinak, B. A., Moore, J. C., & Mallette, M. H. (2004). The writing observation framework: A guide for refining and validating writing instruction. *The Reading Teacher*, 57(4), 322-333.
- Henson, K. T. (2003). Foundations for learner-centered education: A knowledge base. *Education*, 124(1), 5-16.
- Higgins, B., Miller, M., & Wegmann, S. (2007). Teaching to the test...not! Balancing best practice and testing requirements in writing. *The Reading Teacher*, 60(4), 310-319.
- Ho, B. (2006). Effectiveness of using the process approach to teach writing in six Hong Kong primary classrooms. *Perspectives: Working Papers in English and Communication*, 17(1), 1-52.
- Hord, S. M. (1997). *Professional learning communities: Communities of continuous inquiry and improvement*. Austin, TX: Southwest Educational Development Laboratory.
- Hughey, J. B., & Slack, C. (2000). *Teaching children to write: Theory into practice*. Upper Saddle River, NJ: Prentice-Hall.
- Huitt, W. (2003). Constructivism. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved July 30, 2008, from <http://chiron.valdosta.edu/whuitt/col/cogsys/construct.html>
- Jackson, C., & Larkin, M. (2002). Teaching students to use grading rubrics. *Teaching Exceptional Children*, 35(1), 40-45.
- Jacobs, H. H. (1989). *Interdisciplinary curriculum: Design and implementation*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Johns, C. (2004). *Becoming a reflective practitioner* (2nd ed.). Malden, MA: Blackwell.
- Johnson, D. J. (1993). Relationships between oral and written language. *School Psychology, 22*(4), 595-610.
- Kamberelis, G. (1999). Genre development and learning: Children writing stories, science reports and poems. *Research in the Teaching of English, 33*, 403-460.
- Kern, D., Andre, W., Schilke, R., Barton, J., & Conn-McGuire, M. (2003). Less is more: Preparing students for state writing assessments. *The Reading Teacher, 56*(8), 11-21.
- Klentschy, M. P., & Molina-De La Torre, E. (2004). Students' science notebooks and the inquiry process. In W. Saul (Ed.), *Crossing borders in literacy and science instruction: Perspectives on theory and practice* (pp. 340-354). Newark, DE: International Reading Association.
- Kolb, D. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
- Lake, J. (2000). *Literature & science breakthroughs: Connecting language and science skills in the elementary classroom*. Markham, Canada: Pembroke.
- Lane, K. L., Harris, K. R., Graham, S., Weisenbach, J. L., Brindle, M., & Morphy, P. (2008). The effects of self-regulated strategy development on the writing performance of second-grade students with behavioral and writing difficulties. *Journal of Special Education, 41*(4), 234-253.
- Linn, R., & Miller, M. D. (2005). *Measurement and assessment in teaching*. Columbus, OH: Pearson.

- Liu, Z. A., & Akerson, V. L. (2002). Science and language links: A fourth grade intern's attempts to use language arts to improve scientific inquiry skills. *The Electronic Journal of Literacy Through Science*, 1(2). Retrieved August 1, 2008, from http://ejlts.ucdavis.edu/archives/school_practice/Zale.html
- Lundstrom, M. (2005). Link science & literacy and watch test scores skyrocket. *Instructor*, 114(6), 25-60.
- MacArthur, C. A., Graham, S., & Fitzgerald, J. (2006). *Handbook of writing instruction*. New York: The Guilford Press.
- Martin, L. E., Segraves, R., Thacker, S., & Young, L. (2005). The writing process: Three first grade teachers and their students reflect on what was learned. *Reading Psychology*, 26, 235-249.
- McCown, R. R., Driscoll, M., Roop, P., Saklofske, D. H., Schewan, V. L., Kelly, I. W., & Haines, L. P. (1999). *Educational psychology: A learning-centred approach to classroom practice*. Scarborough, Canada: Allyn & Bacon.
- McFayden, K. K. (1997). *Multi-faceted performance evaluation: The role of teaching dossiers*. Edmonton, Canada: University of Alberta. (ERIC Document Reproduction Service No. ED408609).
- Mertens, M. D. (1998). *Research methods in education and psychology: Integrating diversity with quantitative & qualitative approaches*. Thousand Oaks, CA: SAGE.
- Mertler, C. A., & Charles, C. M. (2005). *Introduction to educational research* (5th ed.). Boston: Pearson Education.

- Miller, R. G. (2007). Thinking like a scientist: Exploring transference of science inquiry skills to literacy applications with kindergarten students. *Electronic Journal of Literacy Through Science*, 6(1), 41-53.
- Ministry of Education of Ontario. (1998a). *The Ontario curriculum grades 1-8; Health and physical education*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (1998b). *The Ontario curriculum grades 1-8; The arts*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2004). *The Ontario curriculum grades 1-6; Social studies, grades 7-8; History and geography revised*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2005a). *A guide to effective instruction in writing, Kindergarten to Grade 3*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2005b). *The Ontario curriculum grades 1-8; Mathematics revised*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2006). *The Ontario curriculum grades 1-8; Language revised*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2007). *The Ontario curriculum grades 1-8; Science and technology revised*. Toronto, Canada: Queen's Printer for Ontario.
- Ministry of Education of Ontario. (2008). *Published results-based plan 2008-2009*. Retrieved July 14, 2008, from <http://www.edu.gov.on.ca/eng/about/annualreport/>
- Morawek, A. J., & Gallagher, T. L. (2007, May). *Traits and genres: The development of integrated writing rubrics*. Paper presented at the Annual Convention of the International Reading Association (IRA). Toronto, Canada.

- Mueller, J. (2006). *Authentic assessment toolbox*. Retrieved May 30, 2006, from <http://jonathan.mueller.faculty.noctrl.edu/toolbox/rubrics.htm>
- Munns, G., & Woodward, H. (2006). Student engagement and student self-assessment: The REAL framework. *Assessment in Education: Principles, Policy, & Practice*, 13(2), 193-213.
- Murray, D. (1985). *A writer teaches writing* (2nd ed.). Boston: Houghton Mifflin.
- Nelley, E., & Smith, A. (2001). *PM benchmark kit: Teacher's notes*. Scarborough, Canada: Nelson Thomson Learning.
- Neuman, S. B. (2005). Readiness for reading and writing--What does it mean? *Early Childhood Today*, 20(2), 8-9.
- Nippold, M. A., Ward-Lonergan, J. M., & Fanning, J. L. (2005). Persuasive writing in children, adolescents, and adults: A study of syntactic, semantic, and pragmatic development. *Language, Speech, & Hearing Services in Schools*, 36, 125-138.
- Northwest Regional Educational Laboratory. (2004). *6 + 1 Trait writing—About*. Retrieved July 18, 2008, from <http://www.nwrel.org/assessment/about.php?ode>
- Oldfather, P. (2002). Learning from students about overcoming motivation problems in literacy learning: A cross-study analysis and synthesis. *Reading & Writing Quarterly*, 18, 343-352.
- Organisation for Economic Co-operation and Development. (2006). *Programme for international student assessment*. Retrieved August 13, 2008, from <http://www.pisa.oecd.org>
- Pajares, F. (2003). Self-efficacy beliefs, motivation, and achievement in writing: A review of literature. *Reading & Writing Quarterly*, 19, 139-158.

Patel, P., & Laud, L. (2009). Helping students to add detail and flair to their stories.

Preventing School Failure, 54(1), 2-11.

Payne, D. A. (2003). *Applied educational assessment* (2nd ed.). Belmont, CA:

Wadsworth/Thomson Learning.

Peterson, S. S. (2007). Teaching content with the help of writing across the curriculum.

Middle School Journal, 35(2), 26-33.

Pope, N. (2005). The impact of stress in self- and peer-assessment. *Assessment and*

Evaluation in Higher Education, 30(1), 51-63.

Powell, K. C., & Kalina, C. J. (2009). Cognitive and social constructivism: Developing

tools for an effective classroom. *Education*, 130(2), 241-255.

Purcell-Gates, V., Duke, N. K., & Martineau, J. A. (2007). Learning to read and write

genre-specific text: Roles of authentic experience and explicit teaching. *Reading*

Research Quarterly, 42(1), 8-45.

Richardson, G., & Maltby, H. (1995). Reflection-on-practice: Enhancing student

learning. *Journal of Advanced Nursing*, 22, 235-242.

Rieben, L., Ntamakiliro, L., Gonthier, B., & Fayol, M. (2005). Effects of various early

writing practices on reading and spelling. *Scientific Studies of Reading*, 9(2), 145-

166.

Rief, L. (1990). Finding the value in evaluation: Self-assessment in a middle school

classroom. *Educational Leadership*, 47(6), 24-30.

Risko, V. J., & Walker-Dalhouse, D. (2009). Parents and teachers: Talking with or past

one another-or nor talking at all? *The Reading Teacher*, 62(5), 442-444.

- Rogers, C. R., & Freiberg, H. J. (1994). *Freedom to learn* (3rd ed.). Columbus, OH: Merrill/Macmillan.
- Ross, J. A. (2006). The reliability, validity, and utility of self-assessment. *Practical Assessment Research & Evaluation*, 11(10), 1-13.
- Ross, J. A., Rolheiser, C., & Hogaboam-Gray, A. (1999). Effects of self-evaluation training on narrative writing. *Assessing Writing*, 6(1), 107-132.
- Sadler, R. (1998). Formative assessment: Revisiting the territory. *Assessment in Education*, 5, 77-84.
- Santrock, J. W., Woloshyn, V. E., Gallagher, T. L., DiPetra, T., & Z. A., Marini. (2010). *Educational psychology* (3rd ed.). Toronto, ON: McGraw-Hill Ryerson.
- Schon, D. (1984). *The reflective practitioner: How professionals think in action*. Boston: Basic Books.
- Schultz, K., & Fecho, B. (2000). Society's child: Social context and writing development. *Educational Psychologist*, 35(1), 51-62.
- Shanahan, T., & Robinson, B. (1993). Integration of curriculum or interaction of people? *The Reading Teacher*, 47(2), 158-161.
- SMART Technologies. (2010). *SMART Ideas concept-mapping software*. Retrieved January 25, 2010, from <http://www2.smarttech.com>
- Social Science Research Council. (2008). *Knowledge institutions: K-12 education*. Retrieved August 5, 2008, from <http://programs.ssrc.org/ki/k12education/index.html>
- Spandel, V., & Hicks, J. (2002). *Write traits classroom kits*. Wilmington, MA: Houghton-Mifflin.


- Splitter, L. (2009). Authenticity and constructivism in education. *Studies in Philosophy & Education, 28*(2), 135-151.
- Stead, T. (2002) *Is that a fact? Teaching nonfiction writing K-3*. Portland, ME: Stenhouse.
- Strickland D. S., Bodino, A., Buchan, K., Jones, K. M., Nelson, A., & Rosen, M. (2001). Teaching writing in a time of reform. *The Elementary School Journal, 101*(4), 385-399.
- Stuhlmann, J., Daniel, C., Dellinger, A., Denny, R., & Powers, T. (1999). A generalizability study of the effects of training on teachers' abilities to rate children's writing using a rubric. *Journal of Reading Psychology, 20*, 107-127.
- Sutinen, A. (2008). Constructivism and education: Education as an interpretive transformational process. *Studies in Philosophy & Education, 27*(1), 1-14.
- Tan, K. H. (2008) Qualitatively different ways of experiencing student self-assessment. *Higher Education Research & Development, 27*(1), 15-29.
- Thomas, S., & Oldfather, P. (1997). Intrinsic motivations, literacy, and assessment practices: "That's my grade. That's me." *Educational Psychologist, 32*(2), 107-123.
- Thornton, A. (2005). The artist teacher as reflective practitioner. *International Journal of Art & Design, 24*(2), 166-174.
- Tice, T. (1992). Writing development. *Education Digest, 58*(4), 48-50.
- Tigelaar, D., Dolmans, D., Grave, W., Wolfhagen, I., & Van der Vleuten, C. (2006). Portfolio as a tool to stimulate teachers' reflections. *Medical Teacher, 28*(3), 277-282.

- Tompkins, G. E. (1990). *Teaching writing: Balancing process and product*. Columbus, OH: Merrill.
- Tompkins, G. E. (1994). *Teaching writing: Balancing process and product* (2nd ed.). Columbus, OH: Merrill.
- Tompkins, G. E. (2000). *Teaching writing: Balancing process and product* (3rd ed.). Columbus, OH: Pearson.
- Unger, J., & Fleischman, S. (2004). Is process writing the “write stuff?” *Educational Leadership*, 62(2), 90-91.
- Waldrup, B. (2001). Primary teachers' views about integrating science and literacy. *Investigating: Australian Primary & Junior Science Journal*, 17(1), 38-42.
- Wiersma, W., & Jurs, S. G. (2005). *Research methods in education: An introduction* (8th ed.). Boston: Pearson Education.
- Wiggins, G., & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Wollman-Bonilla, J. (2000). Teaching science writing to first graders: Genre learning and recontextualization. *Research in the Teaching of English*, 35, 35-65.
- Yager, J., McClure, J., & Weld, J. (1993). Applying science across the curriculum. *Educational Leadership*, 50, 79.
- Zhang, J., Scardamalia, M., Lamon, M., Messina, R., & Reeve, R. (2007). Socio-cognitive dynamics of knowledge building in the work of 9- and 10-year-olds. *Education, Technology, Research, & Development*, 55(2), 117-145.
- Zimmerman, B. J., & Risemberg, R. (1997). Becoming a self-regulated writer: A social cognitive perspective. *Contemporary Educational Psychology*, 22(1), 73-92.

Appendix A

Reading Assessment Sample Pages

Level 22

		Reading Record			
Name: _____	Age: _____	Date: _____			
Text: <u>Tricks with a Kite</u>	Level: <u>22</u>	R. W: <u>205</u>			
Accuracy: _____		S.C. Rate: _____			
	E	S.C.	Errors MSV	Self corrections MSV	
<p>Yesterday, Uncle Ken took us down to the beach for the afternoon. It was great fun because he had brought his kite with him. Uncle Ken can do some amazing tricks with it. He launched it very easily from the dry sand. A gust of wind caught the kite and it flew way out over the ocean. Uncle Ken controlled the kite with two handles. Long nylon strings that are tied to the kite are wound around these handles. He leaned back and pulled on one handle, and then the other. The kite did loops and circles. He could even make it come down lower and lower until it almost touched the water. Then it would shoot back up again and flap around above us. Uncle Ken wanted me to have a try. At first I felt nervous and couldn't remember what I had to do. The kite went up very fast and then it crashed down into the hard sand. Luckily it wasn't broken. After a few more tries I could control it quite well. I even managed to make it turn and dive without getting the lines tangled. Tomorrow we are going back to the beach at low tide to practise some more tricks.</p>					
Total					

INSTRUCTIONAL RESOURCE CENTRE
FACULTY OF EDUCATION
BROCK UNIVERSITY

Reading Record © Nelson, 2001

This page may be photocopied for educational use within the purchasing institution.

Level 22: *Tricks with a Kite*

Name: _____

Assessment Record

Analysis of retelling

Narrative Text: ☐ characters ☐ character development ☐ important events ☐ sequence
☐ setting ☐ vocabulary, reference to text ☐ plot/problem

Prompts required: (see page 9 for suggested prompts)

Questions to check for understanding *(tick if understanding acceptable)*

1. How did Uncle Ken control the kite?

Response: ☐

2. What were some of the tricks that he did with the kite?

Response: ☐

3. What happened when Lee tried to fly the kite for the first time?

Response: ☐

4. Why do you think Lee and her uncle flew the kite at the beach?

Response: ☐

5. Explain why people often get nervous when they try something for the first time.

Response: ☐

6. Personal Response. (i.e., What did you like best about the book?

Have you read another book like this? What does it remind you of?)

Response: ☐Reading level Reading level *(with understanding)*: Easy / Instructional / Hard

Accuracy level: _____ = 1: _____ = _____ %

Self-correction rate: _____ = _____ = 1:

Analysis of reading behaviours

Print Concepts:

Fluency: ☐ word by word ☐ some phrasing ☐ phrased reading ☐ expression/intonationCues: ☐ Meaning (makes sense) ☐ Visual (looks right) ☐ Structural (sounds right)

Self-correcting: _____ Self-monitoring: _____

Recommendations:

Teacher:

Date:

Assessment Record © Nelson, 2001

This page may be photocopied for educational use within the purchasing institution.

Appendix B

Reading Assessment Comprehension Rubric

READING COMPREHENSION RUBRIC				
	Level 1	Level 2	Level 3	Level 4
ORGANIZATION				
Retelling of Text (Beginning, Middle, End in Fiction; Main Idea and Supporting Detail in Nonfiction)	Makes use of beginning, middle, end, or main idea and supporting details in retelling or summary of text with limited effectiveness	Makes use of beginning, middle, end, or main idea and supporting details in retelling or summary of text with some effectiveness	Makes use of beginning, middle, end, or main idea and supporting details in retelling or summary of text with considerable effectiveness	Makes use of beginning, middle, end, or main idea and supporting details in retelling or summary of text with a high degree of effectiveness
Text Elements (Characters, Setting, Problem, Solution in Fiction; Headings, Subheadings, Graphs in Nonfiction)	Refers to few or no text elements in retelling or summary with limited effectiveness	Refers to some text elements in retelling or summary with some effectiveness	Refers to most text elements in retelling or summary with considerable effectiveness	Refers to all text elements in retelling or summary with a high degree of effectiveness
REASONING				
Synthesizing and Interpreting the Main Idea and Supporting Details	Offers a limited understanding of few of the important supporting facts and details	Offers some understanding of some of the important supporting facts and details	Offers a considerable understanding of most of the important supporting facts and details	Offers a high degree of understanding of all or almost all of the important supporting facts and details
Text Interpretation and Inferential Skills	Shows limited aptitude at making inferences, relying mostly on literal interpretations of the text	Shows some aptitude at making inferences, with some literal interpretation of the text	Shows considerable aptitude at making inferences, with little literal interpretation of the text	Shows a high degree of aptitude at making inferences, with little or no literal interpretation of the text
COMMUNICATION				
Making Connections to Personal Experience	Makes few or no connections to personal experiences with limited effectiveness	Makes some connections to personal experiences with some effectiveness	Makes many connections to personal experiences with considerable effectiveness	Makes extensive, higher-level connections to personal experiences with a high degree of effectiveness
RESPONSE				
Interest and Engagement in Responding to the Text	Displays little interest in the text with a limited range of emotional responses	Displays some interest in the text with some range of emotional responses	Displays a general interest in the text with a considerable range of emotional responses	Displays extensive interest in the text with a high degree of range of emotional responses

Appendix C

Teacher-Created Integrated Rubrics

RECOUNT WRITING AND IDEAS TEACHER-CREATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Purpose and Content	I had trouble coming up with ideas to tell about my personal experience	I provided some ideas to tell about my personal experience	I provided good ideas and details to tell about my personal experience	I provided great ideas and many details to tell about my personal experience
Organization of Events	I had a hard time grabbing the reader's interest and gave a few of the events of my personal experience in order from beginning to end	I did a fair job of grabbing the reader's interest and gave some of the events of my personal experience in order from beginning to end	I did a good job of grabbing the reader's interest and gave most of the events of my personal experience in order from beginning to end	I did a great job of grabbing the reader's interest and gave all of the events of my personal experience in order from beginning to end
Background	I provided little information about the setting, participants and events of my personal experience	I provided some information about the setting, participants and events of my personal experience	I provided a lot of information about the setting, participants and events of my personal experience	I provided detailed, important background information about the setting, participants and events of my personal experience
Conclusion	I forgot to give a conclusion to my recount	I give a conclusion that is a little bit connected to my recount	I give a personal conclusion that closes up my recount	I give a detailed, personal conclusion that properly closes up my recount
Topic Understanding	I have a little understanding of my topic	I have a general understanding of my topic	I have a good understanding of my topic	I have an excellent understanding of my topic
Main Idea/Focus	I had trouble staying focused on my topic throughout my piece	Some of the time I focused on my topic throughout my piece	I usually focused on my topic throughout my piece	I always focused on my topic throughout my piece

REPORT WRITING AND ORGANIZATION TEACHER-CREATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Purpose	I provided a little factual information to describe my topic	I provided some factual information to describe my topic	I provided a good amount of factual information to describe my topic	I provided a great amount of factual information to describe my topic
Introduction	I had trouble including any introduction to my report	I included a simple introduction to my report	I included a good introduction to my report that would interest the reader	I included a powerful introduction to my report, that would make the reader excited about reading my report
Organization	I had trouble organizing my report, and it might not make sense to the reader	I organized my report in a way that makes some sense to the reader	I organized my report in a way that makes good sense to the reader	I organized my report in a way that makes excellent sense to the reader
Details	I did not provide any details about the information in my report	I provided some details about the information in my report	I provided good details about most of the information in my report	I provided excellent details about all of the information in my report
Conclusion	I had trouble writing any conclusion to my report	I wrote a simple conclusion that was connected to the main idea of my report	I wrote a good conclusion that was well connected to the main idea of my report	I wrote an excellent conclusion that was clearly connected to the main idea of my report
Main Idea/Focus	I had trouble staying focused on my topic throughout my report	Some of the time I focused on my topic throughout my report	I usually focused on my topic throughout my report	I always focused on my topic throughout my report

PERSUASIVE WRITING AND SENTENCE FLUENCY TEACHER-CREATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Purpose	I had trouble coming up with ideas to convince the reader to see things my way	I provided some ideas to convince the reader to see things my way	I provided good ideas and details to convince the reader to see things my way	I provided great ideas and many details to convince the reader to see things my way
How I Feel About My Topic (Position)	I had a hard time including a position in my argument, and the reader might not know how I feel about my topic	I gave somewhat of a position in my argument and the reader might not know how I feel about my topic	I gave a good position in my argument and the reader knows how I feel about my topic	I gave a clear position in my argument and the reader definitely knows how I feel about my topic
Details	I provided a few details to back up my argument	I provided some details to back up my argument	I provided several important details to back up my argument	I provided many important details to back up my argument
Conclusion	I had trouble writing any conclusion that was connected to my position about my topic	I wrote a simple conclusion that was connected to my position about my topic	I wrote a good conclusion that was clearly connected to my position about my topic	I wrote an excellent conclusion that was clearly connected to my position about my topic
Sentence Fluency	I wrote short sentences that are difficult to read and have some sentences that go on and on	I wrote some sentences that are easy to read but have some sentences that go on and on	I usually wrote sentences that are natural and easy to read without sentences that go on and on	I wrote sentences that are smooth, natural, and easy to read without sentences that go on and on
Sentence Variety	A few of my sentences begin differently making and the reader may not be interested in my writing	Some of my sentences begin differently making the reader a bit interested in my writing	Most of my sentences begin differently making the reader interested in my writing	My sentences begin differently making the reader really interested in my writing

NARRATIVE WRITING AND VOICE TEACHER-CREATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Purpose	I have a hard time understanding what a narrative is, and I have included a few narrative elements in my story	I have a fair understanding of what a narrative is, and I have included some of the elements of a narrative in my story	I have a good understanding of what a narrative is, and I have included most of the elements of a narrative in my story	I have an excellent understanding of what a narrative is and I have included all of the elements of a narrative in my story
Introduction	I had a difficult time writing an introduction to the story	I have an introduction to the story, but I need to make it more interesting to the reader	I have a good introduction to the story that makes sense	I have a clear introduction to the story that makes sense and grabs the reader's attention
Characters and Setting	I do not have a setting or characters at the beginning of the story	I present a setting or characters at the beginning of the story, and I need to add more detail	I present a setting and characters at the beginning of the story, but they need more detail	I present a clear, detailed setting, and well-described characters at the beginning of the story
Problem	I do not have problem or conflict in my story	I have a problem in my story, but it is not connected to my character(s)	I have a problem in the story that directly affects my character(s)	I have a clear problem in my story that directly affects my character(s)
Resolution	I have no resolution to my story	I have a resolution to my story, but I need to make it more interesting to the reader	I have an interesting resolution to my story	I have an extremely creative and interesting resolution to my story
Reader Interest	I use few or no words and sentences that are interesting to the reader	I use some words and sentences that are interesting to the reader	I use several words and sentences that are interesting to the reader	I use many words and sentences that are very interesting to the reader
Writing Passion	I show little or no emotion in my story, and the reader does not know how I feel about my story	I show some emotion in my story, but the reader has a hard time deciding how I really feel about my story	I show several feelings and emotions in my story, and the reader can tell I care about my story	I show many feelings and emotions in my story, and the reader can tell I really care about my story

PROCEDURAL WRITING AND WORD CHOICE TEACHER-CREATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Outline	I did not write a procedure to explain and organize ideas and information	I wrote parts of a procedure to explain and organize ideas and information	I wrote a complete procedure to explain and organize my ideas and information	I wrote a complete procedure including illustrations, to explain and organize ideas and information
Purpose	I did not include a purpose to communicate a procedural idea	I included part of a purpose to communicate a procedural idea	I included a simple purpose to communicate a procedural idea	I included a clear and detailed purpose to communicate a procedural idea
Materials	I had difficulty making a list of materials, and included few or no items in my list	I used planning skills to identify and list some materials	I used planning skills to identify and list all materials	I used excellent planning skills to identify and list all materials and their quantities
Procedural Steps	I gave a list of few or no steps in my procedure	I gave a list of some of the steps in my procedure	I gave a complete list of steps in my procedure, but I could add more detail	I gave a complete and detailed list of steps in my procedure
Procedural Conclusion	I did not include a conclusion to this procedure	I included part of a conclusion to this procedure	I included a simple conclusion that was connected to the goal of the procedure	I included a clear conclusion that was connected to the goal of the procedure
Wording	I used words that were unclear or do not relate to the procedure to communicate my ideas	I used some appropriate words to communicate my ideas	I used several appropriate words to communicate my ideas	I used many clear and appropriate words to communicate my ideas
Verbs and Links	I used incorrect verb tenses and few or no adjectives to express my ideas	I used some simple verbs, conjunctions (<i>e.g., first, next, then, after</i>), or adjectives to express my ideas	I used several powerful verbs, conjunctions (<i>e.g., first, next, then, after</i>), and interesting adjectives to express my ideas	I used many powerful verbs, conjunctions (<i>e.g., first, next, then, after</i>), and interesting adjectives to express my ideas

Appendix D

Student-Developed Integrated Rubrics

RECOUNT WRITING AND IDEAS STUDENT-GENERATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Who the recount is about	I did not tell who the recount is about	I gave a few good ideas telling who the recount is about	I gave some good ideas telling who the recount is about	I gave lots of good ideas telling who the recount is about
What the recount is about	I did not tell what the recount is about	I gave a few good ideas telling what the recount is about	I gave some good ideas telling what the recount is about	I gave lots of good ideas telling what the recount is about
Where the recount took place	I did not tell where the recount took place	I gave a few good ideas telling where the recount took place	I gave some good ideas telling where the recount took place	I gave lots of good ideas telling where the recount took place
When the recount took place	I did not tell when the recount took place	I gave a few good ideas telling when the recount took place	I gave some good ideas telling when the recount took place	I gave lots of good ideas telling when the recount took place
Why the recount took place	I did not tell why the recount took place	I gave a few good ideas telling why the recount took place	I gave some good ideas telling why the recount took place	I gave lots of good ideas telling why the recount took place
How the recount took place	I did not tell how the recount took place	I gave a few good ideas telling how the recount took place	I gave some good ideas telling how the recount took place	I gave lots of good ideas telling how the recount took place
Main Idea	I did not stick to the main idea at all in the recount	I stuck to the main ideas through a little of the recount	I stuck to the main idea through most of the recount	I stuck to the main idea through the whole recount
Details	I did not give any extra details in the recount	I gave a few good details in the recount	I gave some good details in the recount	I gave lots of good details in the recount
Spelling and Punctuation	I made many (7 or more) spelling or punctuation mistakes in the recount	I made some (5-6) spelling or punctuation mistakes in the recount	I made a few (3-4) spelling or punctuation mistakes in the recount	I made no spelling or punctuation mistakes in the recount

REPORT WRITING AND ORGANIZATION STUDENT-GENERATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Introduction	I did not write an introduction	I wrote an introduction but it was not very interesting or creative	I got the reader's attention by writing a somewhat interesting introduction	I really got the reader's attention by writing a creative and interesting introduction
Middle	I provided hardly any or no detail and did not stick to my topic and main idea throughout the report	I provided some detail and stuck to my topic and main idea throughout a little of the report	I provided fairly good detail and stuck to my topic and main idea throughout most of the report	I provided lots of detail and stuck to my topic and main idea throughout the whole report
Conclusion	I did not write a conclusion	I provided one short, closing sentence with little connection to my topic	I provided some concluding detail and I closed up my writing fairly nicely by connecting to my topic	I provided lots of concluding detail and I closed up my writing very nicely by connecting to my topic
Nonfiction Facts	Little or none of my report contains factual information	Some of my report contains factual information	Most of my report contains factual information	All of my report contains factual information
Subtitles	I included few or no appropriate subtitles in my report	I included some appropriate subtitles in my report	I included most appropriate subtitles in my report	I included all appropriate subtitles in my report
Conventions (Spelling and Punctuation)	I have many (5 or more) spelling and/or punctuation mistakes	I have some (3-4) spelling and/or punctuation mistakes	I have a few (1-2) spelling and/or punctuation mistakes	I have no spelling and/or punctuation mistakes
Neatness	My report is not neat	My report is somewhat neat	My report is neat	My report is very neat

PERSUASIVE WRITING AND SENTENCE FLUENCY STUDENT-GENERATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Clear Sentences	My writing has lots (5 or more) of run-on sentences. My sentences are unclear and make no sense	My writing has a few (3-4) run-on sentences. My sentences are somewhat clear and they make some sense	My writing has a couple (1-2) of run-on sentences. My sentences are fairly clear and they make good sense	My writing has no run-on sentences. My sentences are clear and they make excellent sense
Sentences That Flow	Few or none of my sentences flow smoothly, and lots of them might sound choppy to the reader	Some of my sentences flow smoothly, but they might sound choppy to the reader	Most of my sentences flow smoothly and sound pretty nice to the reader	All of my sentences flow smoothly and sound nice to the reader
Sentence Beginnings	All of my sentences started with the same beginning	I started a couple of my sentences with different beginnings	I started some of my sentences with different beginnings, and most of them were interesting	I started most of my sentences with different, interesting beginnings
Opinion (Introduction)	I did not include an introduction or an opinion in my persuasive writing piece	I gave an introduction, providing a simple opinion to the reader	I gave a fairly good introduction, providing a fairly clear opinion to the reader	I gave an excellent introduction, providing a clear opinion to the reader
Reasons	I gave no reasons to convince the reader of my opinion	I gave a couple of reasons to convince the reader of my opinion	I gave three reasons to convince the reader of my opinion	I gave at least three really good reasons to convince the reader of my opinion
Restating My Opinion	I did not restate my opinion, nor did I give a conclusion	I somewhat restated my opinion and gave a short conclusion	I restated my opinion and gave a good conclusion with some detail	I restated my opinion and gave a very good conclusion with lots of detail

NARRATIVE WRITING AND VOICE STUDENT-GENERATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Clear Voice (Personality and Emotion of the Writer)	My voice comes out either a little or not at all clearly in my piece of writing	My voice comes out somewhat clearly in some of my piece of writing	My voice comes out clearly in most of my piece of writing	My voice comes out very clearly in my whole piece of writing
Characters	My story has no main character	My story has a main character, but I give very little description of my character	My story has at least one main character whom I describe in some detail	My story has at least one main character whom I describe in detail
Setting	I do not tell where and when my story takes place	I tell where and when my story takes place with little or no detail	I tell where and when my story takes place with some detail	I tell where and when my story takes place with lots of interesting details
Problem	I have no problem in my story	I have a problem but it is not introduced very well	I have a clear problem, and I introduced my problem fairly well	I have a very clear and creative problem, and I introduce my problem very well
Events	I did not include any events in the middle of my story	I include one or two events that make some sense	I include three events in my story that are fairly clear and make sense	I include at least four events in my story that are very clear and make excellent sense
Solution/ Resolution	I have no solution/ resolution to the problem	I have a solution/ resolution to the problem	I have a clear solution/ resolution that is connected to the problem	I have a very clear solution/ resolution that is connected to the problem, and closes up my writing very nicely

PROCEDURAL WRITING AND WORD CHOICE STUDENT-GENERATED RUBRIC				
	Level 1	Level 2	Level 3	Level 4
Procedure	I did not write a procedure to explain how to build my structure.	I wrote some of a procedure to explain how to build my structure.	I wrote a complete procedure to explain how to build my structure.	I wrote a complete procedure, including illustrations, to explain how to build my structure.
Purpose	I did not include a purpose.	I included a purpose but it is not clear and detailed.	I included a clear purpose.	I included a clear and detailed purpose.
Materials	I used no planning skills to identify and list materials.	I used planning skills to identify and list some materials.	I used good planning skills to identify and list all materials.	I used excellent planning skills to identify and list all materials and how much I needed.
Steps	I gave no list of my steps in my procedural writing.	I gave a list of my steps, but some did not make sense to my reader.	I gave a complete list of my steps, but could have made these more clear.	I gave a complete and detailed list of my steps in order.
Conclusion	I gave no conclusion that would connect to my purpose.	I gave a conclusion that somewhat connected to my purpose.	I gave a conclusion that connected to my purpose.	I gave a very clear conclusion that connected to my purpose.
Key Words	I used words in my writing that did not make sense.	I used words in my writing that made some sense.	I used words in my writing that made sense.	I used words in my writing that made excellent sense.
Verbs and Links	I did not use any verbs or links to express my ideas.	I used some verbs and links (e.g., <i>first</i> , <i>next</i> , <i>then</i> , <i>after</i>), to express my ideas.	I used verbs and links (e.g., <i>first</i> , <i>next</i> , <i>then</i> , <i>after</i>), to express my ideas.	I used strong verbs and links (e.g., <i>first</i> , <i>next</i> , <i>then</i> , <i>after</i>), to express my ideas.

Appendix E

Student Interview Protocol

I would like to ask you some questions about writing today. You may look in your *Writer's Notebooks* to help you answer any questions if you wish.

1. Tell me about the steps that you take from beginning to end when you are writing.
2. What are the traits of writing? Can you give me some examples of the traits of writing?
3. Which traits of writing are your favourites to include in your writing? Why are these your favourites?
4. What are the forms of writing? Which forms of writing do you know about? Could you describe these for me? Which forms of writing do you like to use when you're writing?
5. If you were a teacher, what would you do to help your students improve their writing?
6. What is a rubric? What is it used for? Who uses a rubric?
7. How do you use the writing rubrics to help improve your writing? How does your writing change after you use the writing rubrics to check your written work?
8. How could the rubrics be improved, to make them easier for students to use?
9. What is your favourite science topic? Why is this your favourite topic? Tell me about this topic.
10. Does reading about science topics help you when you have to then write about these science topics? Why or why not?
11. Which type of reading (read-alouds, shared reading, guided reading, reading centres, independent reading) is most useful in helping you to learn about science? Why?
12. Why do you think we write about the science topics we are studying?
13. What is the most interesting piece of writing you have created so far this year? Tell me about this piece.

14. Is there anything else about writing, science, or rubrics that you would like to share with me?

Appendix F

Teacher-Participant Interview Protocol

1. I would like to ask you some questions about the writing instruction and assessment strategies that you have been observing and taking part in for this current research study.
2. Describe the engagement level of students during writing lessons?
3. Which lessons have appeared to maintain the highest level of interest among students? Why do you think this is the case?
4. Which forms and traits do you feel students struggle the most with? struggle the least with?
5. Which teaching strategies appear to be the most/least effective during writing instruction? (list strategies as examples if there is hesitation).
6. Do you feel that students are comfortable and adept at conducting self-assessments? Why or why not?
7. What additional support could be provided to students in helping them improve their accuracy and ease in making self-assessments?
8. What, if any, modifications could be made to the student writing rubrics?
9. What is the easiest/most difficult part of scoring students' written compositions?
10. In terms of the student reflections, which questions do you feel students can most easily address? Based on your observations, which reflection areas appear more difficult for students to address?
11. How can the student reflections be refined to facilitate the reflective process for students?
12. What do you perceive to be the benefits/drawbacks to an integrated science and writing program?
13. Do you feel that content-area reading (read-alouds, guided reading, shared reading, reading centres, and independent reading), particularly in the area of science, has an impact on students' understanding of key concepts? Please explain.

14. Which strand of the grade 3 science curriculum do you feel best lends itself to reading and writing connections? Why?
15. Are there any additional comments you would like to share?

Appendix G**Student Reflection Prompts****Recount Writing Reflection**

Recount writing is

The ideas trait is

Describe how you used the rubric to help you write your piece.

I am proud of this piece of writing because

For me, the easiest part about writing is

For me, the hardest part about writing is

These are some of the **science words** I included in my writing:

By including information about science in my writing, I learned the following things about **Growth and Changes in Plants**:

- ---
- ---
- ---
- ---
- ---
- ---

Report Writing Reflection

Report writing is

The organization trait is

Describe how you used the rubric to help you write your piece.

I am proud of this piece of writing because

For me, the easiest part about writing is

For me, the hardest part about writing is

These are some of the **science words** I included in my writing:

By including information about science in my writing, I learned the following things about **Growth and Changes in Plants**:

- ---
- ---
- ---
- ---
- ---
- ---

Persuasive Writing Reflection

Persuasive writing is

The sentence fluency trait is

Describe how you used the rubric to help you write your piece.

I am proud of this piece of writing because

For me, the easiest part about writing is

For me, the hardest part about writing is

These are some of the **science words** I included in my writing:

By including information about science in my writing, I learned the following things about **Soils in the Environment**:

- ---
- ---
- ---
- ---
- ---
- ---

Narrative Writing Reflection

Narrative writing is

The voice trait is

Describe how you used the rubric to help you write your piece.

I am proud of this piece of writing because

For me, the easiest part about writing is

For me, the hardest part about writing is

These are some of the **science words** I included in my writing:

By including information about science in my writing, I learned the following things about **Forces Causing Movement**:

- ---
- ---
- ---
- ---
- ---
- ---

Procedural Writing Reflection

Procedural writing is

The word choice trait is

Describe how you used the rubric to help you write your piece.

I am proud of this piece of writing because

For me, the easiest part about writing is

For me, the hardest part about writing is

These are some of the **science words** I included in my writing:

By including information about science in my writing, I learned the following things about **Strong and Stable Structures**:

- ---
- ---
- ---
- ---
- ---
- ---

Appendix H

Teacher Reflection Prompts

Please refer to the following areas to record any thoughts, opinions, ideas, and/or observations. Reflections can be recorded on lined paper or in a journal/notebook. All reflections should be dated.

1) Writing Instruction

- General Points
- Traits
- Forms
- Integrating Science Content

2) Writing Assessment

- Student Self-Assessment Practices
- Student Rubrics
- Teachers' Assessments of Students' Writing
- Peer Collaboration in Assessment

3) Integrated Curriculum

- Writing Instruction Based on Science Strands
- Students' Prior Knowledge of Science Concepts
- Students' Science Knowledge as Displayed in their Writing

4) Reflections

- Students' Reflective Practices
- Teacher as Reflective Practitioner

Appendix I

Research Ethics Board Clearance Letter



**Brock
University**

Office of Research Services

Research Ethics Office

St. Catharines, Ontario, Canada L2S 3A1

T: 905-688-5550, Ext. 3035/4876 F: 905-688-0748

www.brocku.ca

DATE: October 23, 2008

FROM: Michelle McGinn, Chair
Research Ethics Board (REB)

TO: Tiffany Gallagher, Education
Alison Morawek

FILE: 08-072 GALLAGHER/MORAWEK
Masters Thesis/Project

TITLE: Writing Instruction and Assessment Integrated into Content Curriculum

Michelle K. McGinn

The Brock University Research Ethics Board has reviewed the above research proposal.

DECISION: ACCEPTED AS CLARIFIED

This project has received ethics clearance for the period of **October 23, 2008 to August 30, 2009** subject to full R₁ ratification at the Research Ethics Board's next scheduled meeting. The clearance period may be extended upon request. *The study may now proceed.*

Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and cleared by the REB. During the course of research no deviations from, or changes to, the protocol, recruitment, or consent forms may be initiated without prior written clearance from the REB. The Board must provide clearance for any modifications before they can be implemented. If you wish to modify your research project, please refer to <http://www.brocku.ca/researchservices/forms> to complete the appropriate form Revision or Modification to an Ongoing Application.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-Council Policy Statement requires that ongoing research be monitored. A Final Report is required for all projects upon completion of the project. Researchers with projects lasting more than one year are required to submit a Continuing Review Report annually. The Office of Research Services will contact you when this form Continuing Review/Final Report is required.

Please quote your REB file number on all future correspondence.

MM/an